

# NEWS

## SCIENCES

### Synchrotron X-rays could improve commercial permanent magnets (18 November 2005)

Scientists at the U.S. Department of Energy's Argonne National Laboratory have recently unearthed new clues to making magnets longer lasting and more powerful through element-specific X-ray magnetic circular dichroism (XMCD) measurements. They have analyzed magnetic moment reversal at each of two inequivalent Nd sites (*g* and *f* sites) in a tetragonal single crystal of Nd<sub>2</sub>Fe<sub>14</sub>B, which is currently known to be the strongest permanent magnet. The results provide clear evidence that intrinsic magnetic stability has its atomic origins predominantly at Nd *g* sites, which exhibit a strong preference for *c*-axis alignment at ambient temperature and dictate the macroscopic easy-axis direction. Chemical substitution at Nd *f* sites, which undermines stability by favoring the *xy* plane, could enhance intrinsic coercivity. For more information, contact Catherine Foster (+1-630-252-5580, cfoster@anl.gov) at Argonne, and also see the paper, 'Atomic Origin of Magnetocrystalline Anisotropy in Nd<sub>2</sub>Fe<sub>14</sub>B', D. Haskel *et al.*, *Phys. Rev. Lett.*, 2005; 95: 217207.

### Time-resolved X-ray spectroscopy tracks photosynthetic O<sub>2</sub> formation (11 November 2005)

Natural photosynthesis can convert solar energy into chemical energy with almost 100% efficiency. During photosynthesis, O<sub>2</sub> is evolved at a tetra manganese-calcium complex bound to the proteins of photosystem II. As the details of the mechanism have not been fully understood, artificial solar systems still capture only a minute amount of energy. Very recently, a German research group has succeeded in providing new insights into the mechanism by means of time-resolved X-ray absorption spectroscopy, which measures Mn K X-ray fluorescence after laser-flash illumination with a time resolution of 10 μs. The model of the so-called S-cycle treats the manganese complex cycles through five oxidation states, but only four intermediates have been identified experimentally (S0 through S3). Dioxygen is formed during the transition from S3 to S0, but the expected S4 intermediate in this transition has been elusive. Real-time X-ray monitoring of photosynthetic O<sub>2</sub> production has identified the S4 intermediate and, in contrast to previous proposals, the research group concluded that it is formed by a deprotonation process rather than by electron transfer. The experiments were done at beamline ID26, European Synchrotron Radiation Facility (ESRF), Grenoble, France. For more information, see the paper, 'Photosynthetic O<sub>2</sub> Formation Tracked by Time-Resolved X-ray Experiments', M. Haumann *et al.*, *Science*, 2005; 310: 1019–1021.

### In-situ X-ray analysis reveals how dioxin forms during waste incineration (21 October 2005)

Japanese scientists at Kyoto University have recently found that copper plays a significant role in the formation of toxic dioxin during the incineration of urban waste. They measured copper K X-ray absorption spectra for fly ash, and investigated the changes in oxidation number when the temperature was controlled near 300 °C, where dioxin is sometimes formed. The data suggests some clear correlation between the existence of cuprous chloride (CuCl) and the formation of dioxin. The experiments were done at beamline BL01B1, SPring-8, Harima, Japan. The scientists presented the results at the 41st Annual Conference on X-Ray Chemical Analysis, Japan held at Fukui Institute for Fundamental Chemistry, Kyoto University. For more information, contact Professor Masaki Takaoka, Kyoto University, Phone: +81-75-753-5162, Fax: +81-75-753-5170, takaoka@epsehost.env.kyoto-u.ac.jp

### Sulfur and iron X-ray fluorescence analysis of the wooden timbers of the English warship Mary Rose (26 September 2005)

An international team led by Professor M. Sandström (University of Stockholm) has analyzed the sulfur and iron composition

of the wooden timbers of the Mary Rose, a warship of King Henry VIII of England which was wrecked in 1545 and salvaged two decades ago. Synchrotron X-rays from the Stanford Synchrotron Radiation Laboratory (USA) and the European Synchrotron Radiation Facility (France) were employed. The experimental results indicate the surviving wood contains two tons of sulfur in different forms, uniformly distributed within the 280-ton hull. In addition, the Mary Rose contains a great deal of iron from corroded iron bolts, nails and other objects from the ship. Exposed to oxygen in air, the iron catalyzes the oxidation of sulfur into sulfuric acid. For more information, see the paper, 'Sulfur accumulation in the timbers of King Henry VIII's warship Mary Rose: a pathway in the sulfur cycle of conservation concern', M. Sandström *et al.*, *Proceedings of the National Academy of Sciences of USA*, 2005; 102: 14165–14170.

### X-ray certifies perfection of one-dimensional Bi nanolines buried in silicon crystal (21 September 2005)

Control of nano-structures with molecular precision is a key problem in nano sciences and technologies. While the surface can be readily imaged by scanning probe microscopes, it is not easy to observe buried structures non-destructively. Dr. O. Sakata and his colleagues recently reported on their success in fabricating Bi nanowires on a Si(001) substrate and their encapsulation in an epitaxially grown crystalline silicon layer. To explore the buried nanowires, they employed X-ray diffraction (reciprocal-lattice space mapping) with 25.3 keV photons at grazing-incidence geometry (~0.1°) using an image plate as a 2D detector. The results indicate that the nanolines maintain their one-dimensional character and Bi dimerization. The experiments were carried out at beamline BL13XU, SPring-8, Harima, Japan. For more information, see the paper, 'Encapsulation of atomic-scale Bi wires in epitaxial silicon without loss of structure', O. Sakata *et al.*, *Phys. Rev. B*, 2005; 72: 121407(R).

## PROFESSIONAL

### New Japanese community for advanced X-ray and neutron reflectometry (17 November 2005)

The Japan Society of Applied Physics (JSAP) recently approved the launch of a new professional group for X-ray and neutron analysis on surfaces and 'buried' interfaces. This is significant in that the new group will bring together those who are currently working with X-ray and neutron reflectometry or those who are simply interested in these subjects. So far in Japan, there have been very few meetings to discuss scientific problems in this area despite growing demand. There also exists a strong demand to plan and build beamlines dedicated to reflectometry and related methods at synchrotron radiation (Photon Factory and SPring-8) and neutron facilities (J-PARC to be started in 2008). The group will discuss applications with respect to a variety of materials, i.e. semiconductors, metals, ceramics, polymers, magnetic materials, and multilayers. It is of key importance to extend the technique in order to devise solutions for difficult problems in realistic specimens—in particular, analysis of specific small areas and/or unstable systems that need to be measured in a very short time. The JSAP has an English-language Web page: <http://www.jsap.or.jp/english/index.html>

### New web page for X-ray free-electron laser (2 November 2005)

xfel.net is a new web site, presenting the latest status of the European X-ray laser project XFEL, which is being prepared at DESY, Hamburg. Visit <http://www.xfel.net>

## NEW PRODUCTS

### SCANNA increases portable X-ray safety with flat panel imager (26 October 2005)

SCANNA, a UK screening and detection specialist company, has released a new panel to upgrade its SCANTRAK portable

X-ray system for daily police and Explosive Ordnance Disposal (EOD) operation. The new product, SCANTRAK WEDGE, is approximately 1 inch thick thus enabling it to fit into tight spaces and sends X-ray images straight to a laptop PC without the need for scanning or processing to speed up image viewing time. In addition, there are no moving parts or fragile mirrors that could break in the field. For more information, contact Scanna MSC Ltd, 179 Piccadilly, London, W1J 9EN, United Kingdom, Phone: +44-207-355-3555, Fax: +44-207-355-3556, <http://www.scanna-msc.com/>

#### **Diamond Materials provides UHV window for X-rays (7 October 2005)**

Diamond Materials, a spin-off company of the Fraunhofer Institute IAF in Freiburg, Germany, has now launched diamond windows to be used in UHV as X-ray or infrared windows at synchrotrons and/or other facilities. Thin CVD diamond has excellent mechanical and thermal properties with only small absorption of X-rays and thus could be a promising alternative to conventional Beryllium windows. For more information, contact Christoph Wild, Managing Director, Diamond Materials GmbH, Tullastr. 72, 79108 Freiburg, Germany, Phone: +49-761-6006554, Fax: +49-761-6006553, [wild@diamond-materials.com](mailto:wild@diamond-materials.com), <http://www.diamond-materials.com>

#### **PANalytical's new focusing mirror makes macromolecular analysis possible on a standard XRD system (9 September 2005)**

PANalytical has added a new focusing mirror to its range of PreFIX optics, allowing transmission diffraction experiments to be carried out on macromolecules, such as proteins, using a standard X-ray diffraction system. Macromolecular materials have traditionally been considered not to be easy subjects for X-ray diffraction, because of their weak scattering characteristics and small sample volumes. Indeed, a lot of effort has been devoted to growing crystals of sufficient size for a single crystal diffractometer. In cases where this was impossible, synchrotron X-rays were required for recording powder patterns. Therefore, the introduction of the new mirror is a breakthrough in macromolecular analysis. As a PreFIX optic, the focusing mirror is interchangeable with all other available incident optics without the need for any realignment. The size of the capillary tube no longer governs angular resolution and peaks narrower than 0.05 degrees can be resolved easily. Use of the X'celerator detector significantly reduces the time taken for data collection. For more information, Phone: +31-546-534444, Fax: +31-546-534592, [info@panalytical.com](mailto:info@panalytical.com), <http://www.panalytical.com/>

### **CORPORATE**

#### **Bruker AXS completes acquisitions of both Roentec AG and Princeton Gamma-Tech Instruments (17 November 2005)**

On October 14th and 26th 2005, Bruker AXS announced agreements for the acquisition of Roentec AG and the microanalysis business of Princeton Gamma-Tech (PGT) Instruments, Inc., respectively. The announcements bring to a close these two complementary acquisitions in the X-ray microanalysis market, which will strengthen the company in the fields of nanotechnology and advanced materials research. For more information, contact Michael Willett, Public Relations & Investor

Relations Officer, Bruker BioSciences Corporation, Phone: +1-978-663-3660 ext. 1411, [Michael.Willett@bruker-biosciences.com](mailto:Michael.Willett@bruker-biosciences.com), <http://www.bruker-axs.de/>

#### **SII NanoTechnology announces acquisition of U.S. Radiant Detector Technologies' X-ray detector business (26 October 2005)**

SII NanoTechnology Inc. recently acquired Radiant Detector Technologies, LLC (Radiant), which was established in Northridge, California, in 2001 by Jan. S. Iwanczyk, Ph.D. and Bradley E. Patt, Ph.D. and has been engaged in the development, manufacture and sales of silicon multi-cathode drift-type X-ray detectors. This acquisition is expected to allow SII NanoTechnology to enhance its fluorescent X-ray analysis technology, in particular, for the environmental analysis market. For more information, contact Inoue, Seiko Instruments Inc. Corporate Communications Dept. Fax: +81-43-211-8011, <http://www.siint.com/en/contact/index.html>

#### **NITON Portable XRF wins gold industrial design excellence award (3 October 2005)**

Thermo Electron Corporation announced that its family of NITON X-ray Fluorescence (XRF) analyzers has recently been awarded a gold IDEA (Industrial Design Excellence Award) in the Medical & Scientific Products category. The IDEA is a program sponsored by BusinessWeek and the Industrial Designers Society of America, and is "dedicated to fostering business and public understanding of the importance of industrial design excellence to the quality of life and the economy" (quote: <http://www.idsa.org/idea/idea2005/>). The IDEA winners are honored at annual ceremonies, i.e. the IDSA 2005 National Conference in Washington D.C. The judges apply the following five criteria: Innovation (how is the design new and unique?), aesthetics (how does the appearance enhance the product?), user (how does the design solution benefit the user?), earth (how is the project ecologically responsible?), and business (How did the design improve the client's business?). For more information about NITON XRF analyzers and accessories, call +1-800-875-1578, e-mail [analyze@thermo.com](mailto:analyze@thermo.com) or visit <http://www.thermo.com/niton>

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## NEWS

### SCIENCES

#### High-energy X-ray diffuse scatter aids in discovery of unexpected novel properties of ferroelectric material (15 January 2006)

Generally, relaxor ferroelectrics exhibit a strong polarization dependence on the applied electric field, which so far has been explained by the behavior of the polar nano-regions (PNRs). Recently, scientists at the U.S. Department of Energy's Brookhaven National Laboratory investigated the short-range polar order of  $\text{Pb}(\text{Zn}_{1/3}\text{Nb}_{2/3})\text{O}_3$  (PZN) under an electric field. X-ray diffuse scattering is very sensitive to local inhomogeneities and the results indicated an unexpected redistribution of PNRs in real space, i.e., the PNR fields preferred to line up perpendicular to the external field instead of aligning with it. The experiments were done at the beamline X22B at the National Synchrotron Light Source (NSLS, at Brookhaven National Laboratory). For more information, see the paper, 'Electric-field-induced redistribution of polar nano-regions in a relaxor ferroelectric', G. Xu et al., *Nature Materials*, 2006; January 15, online edition.

#### X-ray reflectivity from liquid-liquid interface reveals the limitations of classical Gouy-Chapman theory (13 January 2006)

The distribution of ions in solution at an interface is key to the fundamental understanding of electrochemistry as well as to the design of materials and devices such as biomembranes. So far, classical descriptions of ion distributions, such as the Guoy-Chapman theory (see, G. Gouy, *C. R. Acad. Sci.*, 1910; 149: 654 and D. L. Chapman, *Phil. Mag. Ser.*, 1913; 25: 475), which ignores the details of molecular structure, have been widely used. Professor M. Schlossman (University of Illinois at Chicago) and his colleagues recently performed very precise X-ray reflectivity measurements to obtain experimentally ion distributions at the interface between solutions (0.01 ~ 0.08M) of tetrabutylammonium (TBA) tetraphenylborate (TPB) in nitrobenzene and aqueous TBA bromide. They found significant deviations from the Guoy-Chapman theory in describing their data. However, on the other hand, molecular dynamics calculations produced potentials that could be used to predict distributions with the Poisson-Boltzmann equation without adjustable parameters. The experiments were done at the Chemistry and Materials section of the Consortium for Advanced Radiation Sources (ChemMatCARS) beamline 15-ID at the Advanced Photon Source (APS, at Argonne National Laboratory). For more information, see the paper, 'Ion Distributions near a Liquid-Liquid Interface', L. Guangming et al., *Science*, 2006; 311: 216-218.

#### Cornell scientists propose new algorithm for wave propagation and phase retrieval in coherent X-ray diffraction imaging (6 January 2006)

Imaging with coherent X-rays at high spatial resolution is a promising technique for obtaining information on the internal structures of non-crystalline specimens. Researchers at Cornell High Energy Synchrotron Source (CHESS, Cornell University, USA) recently succeeded in extending the Fresnel theory to retrieve phase information needed for a full image reconstruction. The algorithm gives 3D full field imaging with X-rays. This new scheme has been developed for coherent X-rays, but the distorted-object concept can be applied to other diffraction and imaging fields such as using visible light, electrons, and neutrons. The method is particularly important with respect to the utilization of future X-ray sources that have fully coherent photon beams. Part of their work was published in *Phys. Rev. B.*, 2005; 72: 033103. For more information, visit <http://news.chess.cornell.edu/index.html>

#### Synchrotron X-ray fluorescence confirms lead as cause of Beethoven's illness (6 December 2005)

At the Advanced Photon Source (APS) at Argonne, USA, massive amounts of lead have been detected in bone fragments of 19th Century composer Ludwig von Beethoven (1770-1827), indicating the cause of his years of chronic illness. The bone fragments, checked by DNA testing to have come from Beethoven's body, were analyzed by micro X-ray fluorescence. The findings confirm earlier work done on hair samples. Furthermore, neither cadmium nor mercury was found within detectable levels this time. The half life of lead in the human body is about 22 years, and almost 95 percent is captured in the skeletal structure. For more information, contact Catherine Foster, Phone: +1-630-252-5580, [cfoster@anl.gov](mailto:cfoster@anl.gov), <http://www.anl.gov>

### PROFESSIONAL

#### U.K. and Japanese scientists named as laureates of the 2006 Japan Prize (11 January 2006)

The Science and Technology Foundation of Japan announced the names of the two laureates for the 2006 (22<sup>nd</sup>) Japan Prize. They are U.K. scientist, Sir John Houghton CBE FRS, for "Pioneering research on atmospheric structure and composition based on his satellite observation technology and for promotion of international assessments of climate change" in the prize category of "Global Change" and Dr. Akira Endo of Japan for "The Discovery of the Statins" in the prize category of "The development of Novel Therapeutic Concepts and Technologies". The two scientists will receive certificates of merit, and commemorative medals. There is also a cash award of fifty million Japanese yen for each prize category. The presentation ceremony is scheduled to be held in Tokyo at the National Theatre on Thursday 20 April 2006, in the presence of the emperor and emperor. The prize categories for the 2007 (23<sup>rd</sup>) Japan Prize will be "Innovative Devices Inspired by Basic Research" and the "Science and Technology of Harmonious Co-Existence". For further details of the Japan Prize, contact The Science and Technology Foundation of Japan, Phone: +81-3-5545-0551, Fax +81-3-5545-0554, [info@japanprize.jp](mailto:info@japanprize.jp), <http://www.japanprize.jp/English.htm>

#### Chinese plan to participate in the European XFEL project (24 November 2005)

The X-ray free-electron laser (XFEL), which will generate extremely brilliant, ultra-short X-ray pulses with laser-like properties, opens up completely new possibilities for the vast field of structural research. Within the framework of the meeting of the XFEL Steering Committee in Berlin, two representatives of the People's Republic of China's Ministry of Science and Technology signed the Memorandum of Understanding for the European X-ray laser project XFEL. Since the beginning of 2005, the ministries of science from 12 countries (Denmark, France, Germany, Great Britain, Greece, Hungary, Italy, Poland, Russia, Spain, Sweden and Switzerland) have already declared their intention to participate in the preparations for the construction and operation of the XFEL. This research facility, which will be unique in Europe, is due to commence operation in 2012. For more information, contact Petra Folkerts, Phone: +49-40-8998-4977, Fax: +49-40-8998-2020, [petra.folkerts@desy.de](mailto:petra.folkerts@desy.de), <http://www.xfel.net>

### NEW PRODUCTS

#### PANalytical introduces Semyos - EDXRF microspot analysis at a spot diameter of less than 23 µm (5 December 2005)

PANalytical is launching its new EDXRF microspot wafer analyzer system: Semyos. The system was introduced at Semicon Japan 2005. It has been designed for on-product thin film metrology in in-line process control applications for both the semiconductor and data storage industries. With its <23 µm

FWHM microspot, it is able to measure in the scribelines on production wafers. The Semyos wafer analyzer is designed for simultaneous determination of film thickness and composition coupled with the ability to characterize single films and multi-layer stacks. The detector employed is a Peltier-cooled Si Drift detector achieving a resolution of 143 eV. Available in either a single or double load port configuration, it comes with one or two 300mm FOUP openers, one or two 200mm SMIF POD openers or 100-300mm open cassette load modules combined with FOUP or SMIF. For more information, Phone: +31-546-534444, Fax: +31-546-534592, info@panalytical.com, <http://www.panalytical.com/>

### Jordan Valley Semiconductors, Inc. introduces next-generation, X-ray based thin film metrology platform (1 December 2005)

Jordan Valley Semiconductors, Inc. has announced the release of its JVX™ 6200 metrology tool platform, which combines second-generation fast X-ray Reflectivity (XRR), improved micro-spot X-ray Fluorescence (XRF), and industry leading Small Angle X-ray Scattering (SAXS). The new 6200 platform extends X-ray based film measurement and so is much more suitable for high volume production fabs. The SAXS channel has the capability to measure pore size and distribution in porous low-k films. For additional information, contact Brenda Ortiz, Phone: +1-866-515-5200, <http://www.jordanvalleysemi.com>

### Siemens releases dual source computer tomography system (17 November 2005)

Siemens Medical Solutions has announced the world's first dual source computed tomography (CT) system, the SOMATOM Definition, which is faster than any existing CT technology, because it uses two X-ray sources and two detectors at the same time, compared to all other CT systems that use only one source and detector. At 0.33 second per rotation, electrocardiogram- (ECG) synchronized imaging can be performed with 83-millisecond temporal resolution, independent of the heart rate, resulting in motion-free cardiac images. The first SOMATOM Definition was installed at the University of Erlangen (Germany) in October 2005 and is now used for technical and clinical research as well as regular patient care. For further information, contact Holger Reim, Phone: +49-913184-3473, Fax: +49-913184-3047, holger.reim@siemens.com, <http://www.siemens.com/medical>

## CORPORATE

### Bruker AXS completes acquisition of SOCABIM (17 January 2006)

Bruker AXS has announced that it has completed the acquisition of privately held SOCABIM SAS, a company focused on advanced X-ray analysis software for materials research.

This acquisition was originally announced on August 16, 2005, and was expected to close early in 2006. For more information, contact Michael Willett, Public Relations & Investor Relations Officer, Bruker BioSciences Corporation, Phone: +1-978-663-3660 ext. 1411, Michael.Willett@bruker-biosciences.com, <http://www.bruker-axs.de/>

### SII Nano Technology and Carl Zeiss NTS announce sales alliance (17 January 2006)

SII Nano Technology Inc. and Carl Zeiss NTS GmbH, have jointly announced a sales alliance. Based on this alliance, SII Nano Technology will commence marketing in Japan electron microscopes (Scanning Electron Microscope: SEM, Transmission Electron Microscopes: TEM, and Ion Microscopes: XB) produced by Carl Zeiss NTS. For more information, contact Inoue, Seiko Instruments Inc. Corporate Communications Dept. Fax: +81-43-211-8011, <http://www.siint.com/en/contact/index.html>

### XCounter has announced that it is to float on AIM stock market (16 January 2005)

Stockholm-based XCounter, which makes digital X-ray machines that can produce 3D images using low levels of radiation, has announced plans to float on AIM, which is London's junior stock market. The company, which was founded in 1997 and run by a Swedish rocket scientist, hopes to raise between £12m and £14m, valuing the business at around £54m. Trading is expected to have begun on 1 February. Nomura Code Securities is acting as broker and nominated adviser to the float. For further information, contact Tom Francke or Johan Stuart, Phone: +46-8-622-23-00, Fax: +46-8-622-23-12, info@xcounter.se, <http://www.xcounter.se>

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## NEWS

### SCIENCES

#### Synchrotron X-rays unveil nano-world of corrosion (9 February 2006)

Corrosion detracts some 3% from global GDP. From a positive point of view however, chemical attack of metal surfaces may result in surface nano-structures with interesting technological applications such as catalysts and sensors. Professor H. Dosch (Max Planck Institute) and his colleagues have recently clarified a self-organization process on the surface of  $\text{Cu}_3\text{Au}(111)$  single crystal alloy in a sulphuric acid solution, by means of a sophisticated X-ray diffraction technique with the aid of a brilliant synchrotron beam at ESRF, Grenoble, France. They observed many interesting phenomena. In the initial moments of corrosion, an extremely thin gold-rich layer, which had an unexpected crystalline and well-ordered structure, was formed. As the corrosion proceeded, this alloy layer was transformed into gold nano-islands of 20 to 1.5 nm. These islands eventually developed into a porous gold metal layer. For more information, see the paper, "Initial corrosion observed on the atomic scale", F. U. Renner *et al.*, *Nature*, 2006; 439: 707–710.

#### Novel synchrotron X-ray diffraction technique for observing GaAs surface (8 February 2006)

At SPring-8, Harima Japan, Dr. M. Takahashi (Japan Atomic Energy Agency) and his co-workers have recently established a powerful surface X-ray diffraction tool for observing the growth process of semiconductor-like GaAs. The main feature of the method is the use of multi-energy X-rays, and because of this, it is possible to identify both the atomic arrangements and the type of atoms. Another significant advantage is the capability of real-time monitoring due to the employment of a brilliant undulator beam. It was demonstrated that the surface structure called  $c(4 \times 4)$ , which is observed under certain growth conditions, has dimmers that consist of gallium and arsenic atoms in the top surface layer. For more information, see the paper, "Element-Specific Surface X-Ray Diffraction Study of  $\text{GaAs}(001)-c(4 \times 4)$ ", M. Takahashi *et al.*, *Phys. Rev. Lett.*, 2006; 96: 055506.

#### X-ray research for Tate exhibition reveals

##### Constable's working practices (3 February 2006)

The sketch for View on the Stour near Dedham, painted by Constable in 1822, has been analyzed by X-rays prior to Tate Britain's exhibition, Constable: the Great Landscapes, which opens on 1 June 2006. The sketch is the 4th of the 6 large River Stour paintings that Constable exhibited at the Royal Academy during 1819–1825. As with the other River Stour scenes, Constable made a preliminary full-scale compositional sketch in oils when planning the exhibition picture. The X-ray investigation clearly shows that the sketch originally included two boys fishing by the water's edge and a little girl close to one of the wooden beams marking the edge of a boat-building yard in the foreground. These figures were then painted out of the sketch by Constable and replaced by two young boys sitting on the edge of the river bank. In the finished exhibition painting, View on the Stour near Dedham, Constable altered the composition again and did not include the two boys from the sketch. X-ray analysis has successfully revealed a number of such alterations that are not visible on the surface of the work. For more information, contact Helen Beeckmans/Patricia O'Connor, Tate Press Office, Millbank, London SW1P 4RG, Phone: +44-20-7887-8730/32, Fax: +44-20-7887-8729, [pressoffice@tate.org.uk](mailto:pressoffice@tate.org.uk)

#### New opportunities in structure of metallic glass - X-ray diffraction and X-ray absorption spectroscopy assisted by reverse Monte Carlo computation (26 January 2006)

Professor E. Ma (Johns Hopkins University, USA) and his colleagues recently succeeded in explaining the atomic packing of metallic glasses, which are of great importance due to their distinctive mechanical and magnetic properties. The structure

is known as 'amorphous' (non-crystalline) and shows no sharp Bragg peaks in the X-ray diffraction pattern. The research group adopted quite a unique strategy; first, they aimed at obtaining 3D pictures in the short-to-medium range, unlike conventional atomic-level analysis, which looks only at short-range order, and secondly, they did not resort to a predetermined structural model but used reverse Monte Carlo simulations based on experimental X-ray diffraction and absorption data. One of their key findings was that metallic glass atoms do not arrange themselves in a completely random way. Instead, groups of 7–15 atoms tend to arrange themselves around a central atom, forming 3D shapes called Kasper polyhedra, which join together in unique ways as small nanometer-scale clusters. For more information, see the paper, "Atomic packing and short-to-medium-range order in metallic glasses", H. W. Sheng *et al.*, *Nature*, 2006; 439: 419–425.

### PROFESSIONAL

#### British and Chinese synchrotron facilities sign up to future collaboration (20 February 2006)

Diamond Light Source Ltd., the UK's next-generation synchrotron facility, and the Shanghai Synchrotron Radiation Facility (SSRF)/Shanghai Institute of Applied Physics, Chinese Academy of Sciences signed a Memorandum of Understanding (MoU) on collaborative research. Diamond will start operations in January 2007, and SSRF plans to do so 2 years later. This collaboration is part of the UK-China Partners in Science series of activities in China, a joint initiative backed by both the UK and the Chinese governments to increase scientific collaboration between the two countries. For more information on UK-China Partners in Science, visit <http://www.uk.cn/science>

#### Pittcon 2007 announces move from New Orleans to Chicago (13 February 2006)

The Pittsburgh Conference announced that Pittcon 2007 will be moved from New Orleans to Chicago; the dates of the event are 25 February to 1 March 2007. At the same time, the Committee confirmed its commitment to return the Conference to New Orleans in 2008 as planned. With over 20,000 attendees and 1,100 exhibitors, Pittcon is the largest annual scientific meeting of its kind. More information about Pittcon can be found at [www.pittcon.org](http://www.pittcon.org).

### NEW PRODUCTS

#### PHOENIX II: SECTRO's new polarized XRF benchtop analyzer (13 March 2006)

SPECTRO Analytical Instruments, a unit of AMETEK, Inc. has announced the launch of the PHOENIX II benchtop polarized XRF analyzer. The spectrometer combines a 48kV tube and polarized source X-rays with a rugged gas-filled proportional counter detection system, giving better performance for light elements such as Mg, Al and Si as well as S and Cl. The counter design yields a high X-ray count rate throughput and makes use of X-ray filters to separate the spectral peaks of elements with adjacent atomic numbers. For further information, contact Tom Milner, Phone: +49-2821-892-2102, Fax: +49-2821-892-2200, [info@spectro.com](mailto:info@spectro.com)

#### Bruker AXS launches S8 TIGER XRF spectrometer (13 March 2006)

Bruker AXS Inc. has announced the launch of its new S8 TIGER, wavelength dispersive X-ray fluorescence (WDXRF) X-ray spectrometer for various industrial applications, including petrochemistry, cement and mining. Besides being capable of analyzing all elements from Be to U in a wide variety of sample types, the analyzer comes with unique features like TouchControl™ (facile and fail-safe operation) and SampleCare™ (automatic recognition of liquid sample and protection/sealing). For further information, contact Michael Willett, Investor

Relations Officer, Phone: +1-978-663-3660, ext. 1411, [ir@bruker-biosciences.com](mailto:ir@bruker-biosciences.com), <http://www.bruker-axs.de/>

### **PANalytical launches Axios-Metals (28 February 2006)**

PANalytical has extended its range of industry specific, wavelength-dispersive, sequential XRF spectrometers with the launch of the new Axios-Metals system, configured specifically to meet the needs of the steel and metals industries. The spectrometer comes with specially prepared NiFeCo-FP and/or Cu-base-FP software, and the following are viewed as promising applications; production of copper-, aluminum- and titanium-based alloys, iron and steel production including slag analysis at blast furnace and control of incoming goods, precious metal production, soldering alloy production, and monitoring scrap metal and unknown material (including environmental samples). For more information, Phone: +31-546-534444, Fax: +31-546-534592, [info@panalytical.com](mailto:info@panalytical.com), <http://www.panalytical.com/>

### **Shimadzu releases inspeXio, a compact X-ray CT system (11 January 2006)**

Shimadzu has announced the release of inspeXio, an X-ray CT system for non-destructive inspection in industries as well as academic investigation, mainly in the Japanese market. The most important feature is its compact size (W830 × D601 × H587mm, 250kg). The system employs a 10 W X-ray tube and a flat panel

detector of 50mm × 50mm. For more information, Phone: +81-3-3219-5641, Fax: +81-3-3219-5710, [imds05@shimadzu.co.jp](mailto:imds05@shimadzu.co.jp)

## **CORPORATE**

### **2006 Pittcon Heritage Award - M. Horiba (12 March 2006)**

Masao Horiba, founder of HORIBA, Ltd., has been selected as the recipient of the 2006 Pittcon Heritage Award. The company was founded in 1953, following Mr Horiba's pioneering and successful instrumentation of PH meters and infrared gas analyzers. Later the business expanded successfully and is now one of leading analytical and measurement companies in the world. This year's award is the 27th, and Mr Horiba is the 1st non-American recipient. The award is jointly sponsored by the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy (Pittcon) and the Chemical Heritage Foundation. This award recognizes outstanding individuals whose entrepreneurial careers shaped the instrumentation community, inspired achievement, promoted public understanding of the modern instrumentation sciences, and highlighted the role of analytical chemistry in world economies. The award is presented annually at a special ceremony during Pittcon. The recipient's name and achievements are added to a roster of Pittcon Hall of Fame members that includes such industry pioneers as Arnold Beckman, Robert Finnigan, Chester Fisher, Aaron Martin, James Waters and others.



## NEWS

### SCIENCES

#### **Time-resolved X-ray diffraction catches polarization switching in ferroelectric thin films (18 May 2006)**

The traditional tools of nanotechnology—the atomic force microscope and the scanning tunneling microscope—enable scientists to see atoms, but not their response to events, which at that scale occur in the order of nano seconds or shorter. Professor P. Evans (University of Wisconsin-Madison) and his colleagues recently succeeded in visualizing domain wall motion during polarization switching of a  $\text{Pb}(\text{Zr}, \text{Ti})\text{O}_3$  capacitor using time-resolved x-ray microdiffraction. The work was done using Argonne National Laboratory's Advanced Photon Source, a synchrotron light source capable of generating very tightly focused beams of x-rays. The x-rays are delivered to the sample in fast pulses over an area no larger than hundreds of nm. For more information, see the paper, 'Nanosecond Domain Wall Dynamics in Ferroelectric  $\text{Pb}(\text{Zr}, \text{Ti})\text{O}_3$  Thin Films', A. Grigoriev *et al.*, *Phys. Rev. Lett.*, 2006; **96**: 187601

#### **X-ray observation of plastic deformation (12 May 2006)**

It is well known that a piece of metal deforms in an irreversible or plastic manner when it is bent. This property is important from the standpoint of the feasibility of forming various types of metallic products as well as toughness as a structural material. Scientists from Riso National Laboratory, Denmark recently tried taking "snapshots" with hard x-rays. They observed some extremely interesting phenomena, i.e., the emergence and disappearance of the dislocation structure, which takes place during deformation. For more information, see the paper, 'Formation and Subdivision of Deformation Structures During Plastic Deformation', B. Jakobsen *et al.*, *Science*, 2006; **312**: 889

#### **Focusing of hard X-rays to 30 nm scale (31 March 2006)**

Extremely sharp focusing of hard x-rays has been achieved with a device called a Multilayer Laue Lens (MLL), recently developed at Argonne National Laboratory in the United States. The device consists of a stack of alternating layers of metal and silicon, made by depositing progressively thicker layers. The main idea is that the structure can work as a linear zone plate for x-rays. The device has an ability to focus the x-rays with an energy level of 19.5 keV to 30 nm, which is almost the smallest beam size for hard x-rays. Promising applications for a better x-ray lens would be in full-field and/or scanning probe microscopy. For more information, see the paper, 'Nanometer Linear Focusing of Hard X Rays by a Multilayer Laue Lens', H. C. Kang *et al.*, *Phys. Rev. Lett.*, 2006; **96**: 127401

### PROFESSIONAL

#### **The SOLEIL synchrotron commences operation (14 May 2006)**

Located on the Plateau de Saclay, in the Essonne department, SOLEIL is the second third generation synchrotron to be built in France—the first one, the ESRF in Grenoble, was a European project. Very recently, SOLEIL accelerated and injected electrons for the first time in its storage ring. On 14 May, the electrons turned at a speed close to that of light in the 354 m circumference storage ring. The first 2.75 GeV beam injection from the Booster started around noon on 13 May. After 12 hours spent on measurements and adjustments, the electrons made a full turn, and the first photon beams were observed. For more information, visit <http://www.synchrotron-soleil.fr/anglais/index.html>

#### **First experiments completed at Hamburg's VUV-FEL (21 March 2006)**

The VUV-FEL (free-electron laser) at DESY in Hamburg, Germany, is the world's first and, until 2009, the only source of intense laser radiation in the ultraviolet and the soft x-ray range. Since the official start in August 2005, a total of 14 research groups working on cluster physics, solid-state physics, plasma research and biology have carried out the first experiments. The 300 m long facility generated laser flashes with a wavelength of 32 nm for the first time in January 2005, which is the shortest wavelength ever achieved with a free-electron laser. The light flashes are shorter than 50 femto seconds, and this allows scientists to trace various processes on extremely short time scales by taking time-resolved "snapshots" of the reaction process. For more information, visit <http://www.xfel.net/en/index.html>

### NEW PRODUCTS

#### **The latest-generation SPECTRO XEPOS EDXRF (15 May 2006)**

SPECTRO introduced the latest generation of the SPECTRO XEPOS energy-dispersive x-ray fluorescence analyser with polarized excitation at theACHEMA industrial process trade show, Frankfurt am Main, Germany, May 15–19, 2006. The analyzer is now equipped with a Si-drift detector to achieve finer detection limits than its predecessor, especially for the analysis of light elements. The sample plate of the new XEPOS possesses 12 positions for samples between 32 and 40 mm in diameter, allowing automatic analysis for safe, unattended operation. The typically expected target would be screening analyses required by RoHS for the electrical and electronics industries. Other important applications are the chemical and petrochemical industries, the examination of ores and concentrates, and analysis of coatings. For further information, contact Tom Milner, Phone: +49-2821-892-2102, Fax: +49-2821-892-2200, [info@spectro.com](mailto:info@spectro.com)

**ARL ADVANT'X: Thermo Electron's new XRF spectrometer (15 May 2006)**

Thermo Electron Corporation has announced the launch of a new wavelength-dispersive XRF instrument, the ARL ADVANT'X series with IntelliPower™ Technology. The spectrometer is available in three optimum power levels, 1.2, 3.6 and 4.2 kW. All three products are configured to analyze a full spectrum of elements ranging from Be to U, and can be calibrated for the analysis of any unknown material (solids, liquids, loose powders). Application software packages specifically designed for analysis of oxides, petrochemical products and other materials are available as well. For further information, Phone: +1-800-532-4752, [analyze@thermo.com](mailto:analyze@thermo.com), <http://www.thermo.com/elemental>

**METROTOM: Carl Zeiss' X-ray tomography instrument (9 May 2006)**

Carl Zeiss Industrial Metrology recently introduced METROTOM, a powerful computer 3D tomograph for industrial quality assurance. The system makes visible the interior of a workpiece normally inaccessible to probing or optical sensors. It is used to inspect the structure of material and also measures external features. METROTOM permits the generation of CAD models. For further information, contact, Alfons Lindmayer, Phone: +49-7364-20-3539, Fax: +49-7364-20-4657, [lindmayer@zeiss.de](mailto:lindmayer@zeiss.de), <http://www.zeiss.com/>

**New Innov-X initiative to aid RoHS compliance (1 May 2006)**

Innov-X Systems is offering manufacturers and component suppliers the opportunity to build a simple yet effective RoHS compliance program by offering a low-cost trial XRF rental program for those engaged in EMS, OEM, and CM in order to put them at ease with testing and inspection without having to make a large financial commitment. For further

information, Phone: +1-781-938-5005, Fax: +1-781-938-0128, [info@innovxsys.com](mailto:info@innovxsys.com), <http://www.innov-x-sys.com/>

**Oxford unveils Lab-X3500SCI bench-top XRF analyser (30 March 2006)**

Oxford Instruments has unveiled its Lab-X3500SCI analyser, which can determine low levels of S and Cl in petroleum products. The detection limit for S is 3mg/kg (ppm) at a measuring time of 600 sec. The instrument is precalibrated for sulfur methods and meets the specifications of the following standards: ISO 20847, ISO 8754, ASTM D4294, IP336, without the use of helium purge gas. The analyser can be used anywhere and analysis is not affected by changes in ambient temperature or atmospheric pressure. For more information, Phone: +44-1494 442255, Fax: +44-1494 461033, [analytical@oxinst.co.uk](mailto:analytical@oxinst.co.uk), <http://www.oxford-instruments.com/>

**CORPORATE****Rigaku opens new regional X-ray user facility in USA (21 April 2006)**

Rigaku has announced the opening of a new multi-disciplinary analytical x-ray user facility in Cambridge, MA, USA. The laboratory is equipped with the complete suite of Rigaku MiniLab™ x-ray diffraction and x-ray fluorescence products, and is available to prospective users at no cost. Researchers in academia and industry who wish to explore the capabilities of modern analytical x-ray methods and instrumentation can reserve laboratory time for instrument training, the development of experimental methods, and open access instrument usage. For further information, contact: George Stone Rigaku Americas Corporation, Phone: +1-978-474-4660, [George.Stone@Rigaku.com](mailto:George.Stone@Rigaku.com), <http://www.rigakumsc.com/>



## NEWS

### SCIENCES

#### **Grazing incidence X-ray scattering reveals that liquid AuSi alloy shows solid-like crystal structure at surface (7 July 2006)**

Professor P. Pershan (Harvard University, USA) and his colleagues recently found a crystalline monolayer at the surface of the eutectic liquid  $\text{Au}_{82}\text{Si}_{18}$ , at temperatures above the alloy's melting point. This is unusual for a liquid surface, as the atomic arrangements are ordinarily strongly disordered. In addition, they found that the gold-silicon eutectic alloy has 7–8 layers near its surface, whereas many metallic liquids typically show only 2–3 distinct atomic layers. The phenomena are considered as indicative of surface freezing. The research group employed X-ray reflectivity and grazing incidence X-ray diffraction techniques for the analysis. For more information, see the paper, 'Surface Crystallization in a Liquid AuSi Alloy', Oleg G. Shpyrko *et al.*, *Science*, 2006; **313**: 77–80.

#### **Coherent X-ray diffraction reveals real space 3D structures of nanocrystals (6 July 2006)**

The appearance of the ultimate X-ray microscope, with atomic-scale resolution and capable of seeing deep inside objects, has long been awaited. Professor I. Robinson (University College London, UK) and his team recently made a significant step towards realizing this dream, using the technique of coherent X-ray diffraction imaging, the possibility of which was first pointed out by Sayre (*Acta Crystallogr.* 5, 843 (1952)) but not demonstrated until 1999 by Miao *et al.* (*Nature* 400, 342 (1999)). They observed the growth of nanometer-sized Pb crystals inside the vacuum chamber. The results showed that asymmetries in the diffraction pattern can be mapped to deformities, providing a detailed 3-D map of their location in the crystal. This new method shows that the interior structure of atomic displacements within single nanocrystals can be obtained by direct inversion of the diffraction pattern. The technique is an attractive alternative to electron microscopy because of the superior penetration of materials of interest by the electromagnetic waves, which are often less damaging to the sample than electrons. The experiments were done at beamline 34-ID-C at the Advanced Photon Source (APS) in the United States. For more information, see the paper, 'Three-dimensional mapping of a deformation field inside a nanocrystal', Mark A. Pfeifer *et al.*, *Nature*, 2006; **442**: 63–66.

#### **X-ray absorption spectroscopy gives new insights into how DVD works (28 June, 2006)**

Scientists at North Carolina State University, USA recently published an interesting report on the significance of the anomalously high concentration of local Ge-Ge bonds in amorphous  $\text{Ge}_2\text{Sb}_2\text{Te}_5$ , which is commonly used in data storage technologies such as DVD, DVD-RAM etc. The ability to change phases from a crystalline to a non-crystalline state is what allows the DVD to take and hold data. While the basic properties of this alloy are well known, there are still a lot of unsolved problems; we do not know how the process works on a microscopic level. The paper indicates that the amorphous phase is an ideal network structure in which the average number of constraints per atom equals

the network dimensionality. For more information, see the paper, 'Application of Bond Constrain Theory to the Switchable Optical Memory Material  $\text{Ge}_2\text{Sb}_2\text{Te}_5$ ', D. A. Baker *et al.*, *Phys. Rev. Lett.*, 2006; **96**: 255–501.

#### **Time-resolved X-ray spectroscopy catches catalytic reaction on gold nanoparticles (21 June 2006)**

A series of very interesting experiments has been performed at beamline ID26 at the European Synchrotron Radiation facility (ESRF) Grenoble, to see how gold nanoparticles catalyze carbon monoxide (CO) with oxygen ( $\text{O}_2$ ) into carbon dioxide ( $\text{CO}_2$ ). High-energy resolution X-ray absorption spectroscopy reveals how the oxygen becomes chemically active when bound to the particles. The reaction took place when the scientists switched from a flow of  $\text{O}_2$  to one of CO - the  $\text{O}_2$  bound to the gold reacts with the CO to form  $\text{CO}_2$ . The technique can be applied to a variety of reactions. For more information, see the paper, 'Activation of Oxygen on Gold/Alumina Catalysts: In Situ High-Energy-Resolution Fluorescence and Time-Resolved X-ray Spectroscopy', Jeroen A. van Bokhoven *et al.*, *Angewandte Chemie*, 2006; published online 21 June 2006.

### PROFESSIONAL

#### **Workshop on 'buried' interface science with X-rays and neutrons (4 July 2006)**

A workshop on 'buried' interface science with X-rays and neutrons was held in Yokohama, Japan, on 3–4 July. This was one in a series of workshops that have been organized annually since 2001. The precise and non-destructive analysis of nano-structures (dots, wires etc.), which are most likely to be 'buried' under several capping layers, has become extremely important from the standpoint of fundamental understanding as well as its application to electronic, magnetic, optical and other devices. Unfortunately, most sophisticated surface-sensitive techniques are not helpful in such cases, but reflectometry and other related methods using X-rays and neutrons are very promising because they are able to explore atomic-scale structures along their depth. Besides the variety of applications, the workshop also featured intensive discussions of several advanced extensions and/or upgrades of the method. One of the most interesting directions is the combination of the method with grazing-incidence small angle scattering (GISAS). Professor Alain Gibaud (Université du Maine, France) was invited to give a lecture on this topic. Another invited speaker from outside Japan was Dr. Burkhard Beckhoff (Physikalisch-Technische Bundesanstalt, Germany). The workshop proceedings are available from Science Information and Library Service Division, High Energy Accelerator Research Organization (KEK), Phone: +81-29-864-5137, Fax: +81-29-864-4604, irdpub@mail.kek.jp. Another workshop contact, particularly with respect to future plans, is Kenji Sakurai, sakurai@yuhgiri.nims.go.jp.

#### **Series of workshops linked to Cornell fs Energy Recovery Linac (ERL) projects (24 June 2006)**

Cornell High Energy Synchrotron Source (CHESS) invited researchers from around the world to a series of workshops

focused on cutting-edge sciences that will be built up by the proposed Energy Recovery Linac (ERL), which is a next-generation light source. The series of six two-day workshops was held at the Robert Purcell Community Center, Ithaca, NY, USA, between 5 June and 24 June. The workshops covered high-pressure science, ultra-fast processes, materials science, studies of soft-matter, biology, and science with X-ray nanobeams. For more information on ERL, visit <http://erl.chess.cornell.edu/>.

## NEW PRODUCTS

### **PANalytical introduces Oil-Trace package for complete XRF analysis of oil and fuels (11 July 2006)**

PANalytical, has launched Oil-Trace, a new package that enables complete XRF analysis of all types of fuels, oils and oil derivatives. Oil-Trace has been specifically designed to overcome the traditional difficulties associated with analysis of oils. Automatic correction of dark-matrix composition and variations in sample density and volume can contribute to reducing the number of calibrations usually needed for different sample types. Oil-Trace is designed for use with wavelength-dispersive X-ray fluorescence (WDXRF) systems. It is supplied complete with liquid standards for the characterization of the sample matrix in terms of C, H and O, analysis templates and tools. For further information, Phone: +31-546-534444, Fax: +31-546-534592, [info@panalytical.com](mailto:info@panalytical.com), <http://www.panalytical.com/>.

### **WARD'S Natural Science and Brookhaven Lab develop science education kits (10 July 2006)**

Through a Cooperative Research and Development Agreement, the U.S. Department of Energy's Brookhaven National Laboratory and WARD'S Natural Science of Rochester, NY, have developed four science education kits, which are used as hands-on learning tools in the classroom for middle school, high school, and college students. Marketed by WARD'S, the kits focus on environmental chemistry and life science. WARD'S catalog of science education kits can be found at <http://www.wardsci.com/>.

### **Xradia announces new X-ray transmission microscopes for advanced semiconductor packaging (28 June 2006)**

Xradia, Inc., recently announced the sale of three of its MicroXCT™ 3D transmission X-ray microscopes to semiconductor manufacturers for advanced packaging process development and failure analysis. Combining spatial resolution below 1.5 $\mu$ m and feature recognition of 500 nm, with full 3D tomography capability, the microscope is suited to the inspection of C4 ball grid arrays, multi stacked die, flip-chip architectures, solder bumps and packaging interconnects. For further information, Phone: +1-925-288-1228, Fax: +1-925-288-0310, [sales@xradia.com](mailto:sales@xradia.com), <http://www.xradia.com/>.

### **e2v scientific instruments introduces SiriusSD (15 June 2006)**

e2v scientific instruments has launched the SiriusSD, an electrically cooled solid-state silicon drift detector with a new electronic design. It is directly compatible with existing systems, making it easy to integrate with, and thus upgrade, energy-dispersive X-ray materials analysis

equipment. The SiriusSD range includes designs for integration with scanning electron microscopes (SEM) and X-ray fluorescence (XRF) systems. e2v scientific instruments is the only independent EDX detector company that offers true worldwide support, with repair and upgrade facilities based in both Europe and the USA. For further information, contact Joanne Bugg, Phone +1-914-593-6841, [joanne.bugg@e2v.com](mailto:joanne.bugg@e2v.com), <http://www.e2vsi.com/>.

## CORPORATE

### **Rigaku SmartLab wins 2006 R&D 100 Award (6 July 2006)**

Rigaku Americas Corporation has announced that the SmartLab (automatic X-ray diffractometer) has won the 2006 R&D 100 Awards. The award has been presented annually since 1963 by R&D Magazine. Over the years, the R&D 100 Awards have recognized winning products with such household names as Polacolor film (1963), the flashcube (1965), the automated teller machine (1973), the halogen lamp (1974), the fax machine (1975), the liquid crystal display (1980), the printer (1986), the Kodak Photo CD (1991), the Nicoderm antismoking patch (1992), Taxol anticancer drug (1993), lab on a chip (1996), and HDTV (1998). Last year, the Bruker AXS VANTEC-2000 detector was selected for the 2005 R&D 100 Award. Further details of the award can be found at <http://www.rdmag.com/100win.aspx>. The winners of the 2006 R&D 100 Awards will be listed in the September issue of R&D Magazine.

### **Spellman in Valhalla, NY achieves ISO 9001:2000 (29 June 2006)**

Spellman High Voltage Electronics Corporation, an independent manufacturer of high voltage DC power supplies for X-ray instruments, has announced that its Valhalla, New York location has attained ISO 9001:2000 certification, completing the certification process for all of Spellman's manufacturing locations worldwide. In 1994, Spellman High Voltage was the first company in the high voltage electronics industry to achieve ISO 9001:2000 certification. For information on the ISO 9000 & 14000 families of quality and environmental management standards, visit <http://www.iso.org/iso/en/iso9000-14000/index.html>. For technical information on Spellman products, Phone: +1-631-630-3000, <http://www.spellmanhv.com/>.

### **PANalytical opens direct sales and support operation in Korea (1 April 2006)**

PANalytical (Almelo, The Netherlands) has commenced business in Korea directly as a PANalytical entity under the aegis of Spectris Korea, instead of through its agent - the Songjee Industrial Corporation. Songjee and PANalytical have worked together for the past 12 years. The strength of this association is reflected in the new organization with all Songjee employees joining PANalytical Korea. A "Memorandum of Understanding" (MoU) was signed by Mr. JP Song, President of Songjee Industrial Corporation, and Dr Guido Eggermont, Commercial Director of PANalytical BV, in mid-January. For further information Phone: +31-546-534444, Fax: +31-546-534592, [info@panalytical.com/](mailto:info@panalytical.com/), <http://www.panalytical.com/>.



## NEWS

### SCIENCES

#### 3D visualization of plant seed's growth (14 September 2006)

Scientists from CNRS at the University J. Fourier of Grenoble and from the European Synchrotron Radiation Facility (ESRF) have recently succeeded in constructing 3D pictures of a living plant seed using the holotomography technique with synchrotron light. This revealed the presence of a network of voids between the cells that may be used for storing the oxygen needed for efficient germination. For more information, see the paper, 'Quantitative phase tomography of *Arabidopsis* seeds reveals intercellular void network', P. Cloetens *et al.*, Proceedings of the National Academy of Sciences, published online before print 14 September 2006.

#### In-situ X-ray analysis of working catalysis (1 September, 2006)

Professor Hutchings (Cardiff University, UK) and his colleagues recently published some interesting results on vanadium phosphates (VPOs). VPOs are catalysts used in industry to spur the partial oxidation of n-butane to maleic anhydride, which is then used as a starting material for products such as resins and lubricants. The research group utilized in-situ powder X-ray diffraction, in addition to laser Raman and electron paramagnetic resonance spectroscopies. They determined the transformation of VPO phases as a function of temperature and with various reactants and products present over the catalyst. They concluded that the presence of the reactants rapidly converts  $\omega$ -VOPO<sub>4</sub> to  $\delta$ -VOPO<sub>4</sub>, but that the initial formation of the phase may create V<sup>+5</sup> sites associated with increased catalytic activity. For more information, see the paper, 'Chemically Induced Fast Solid-State Transitions of  $\omega$ -VOPO<sub>4</sub> in Vanadium Phosphate Catalyst', M. Conte *et al.*, *Science*, 2006; 313: 1270.

#### Synchrotron X-rays reveal elemental Zr and Ti bulk metallic glass as phantom (1 August, 2006)

Scientists at the Japan Atomic Energy Agency (JAEA) led by Dr W. Utsumi have proved that the formation of bulk metallic glass of elemental Zr and Ti, which was recently reported (see for example, Zhang and Zhao, *Nature*, 2004; 430: 332 and Y. Wang *et al.*, *Phys. Rev. Lett.*; 2005, 95: 155501) was some sort of phantom. The experiment basically took the form of X-ray diffraction in high-temperature and high-pressure conditions, but in addition to the normal energy-dispersive detector, the research group employed an *in situ* angular-dispersive X-ray diffractometer equipped with a 2D detector and X-ray transparent anvils. The disappearance of all the Bragg peaks in the one-dimensional energy-dispersive data could be taken as evidence of amorphization. However, the research group found several intense Bragg spots in their angular-dispersive data, even in the exact same conditions where amorphization was reported. This indicates that Zr and Ti do not form glass, but that the grains grow rapidly. The experiments were carried out at BL14B1 and BL22XU, SPring-8, Japan. For more information, see the paper, 'Does Bulk Metallic Glass of Elemental Zr and Ti Exist?', T. Hattori *et al.*, *Phys. Rev. Lett.*; 2006, 96: 255504.

### PROFESSIONAL

#### FEL at Hamburg reaches water window (7 September, 2006)

At the FLASH facility at DESY, Hamburg, the free-electron laser (FEL) generated laser light flashes at wavelengths between 13.5 and 13.8 nm with an average power of 10 mW

and record energies of up to 170  $\mu$ J/pulse at repetition rates of 150 Hz. Since the pulses have a duration of only around 10 fsec, the peak power can reach 10 GW/pulse. These powers are larger than is currently available at even the biggest plasma X-ray laser facilities worldwide. The use of the fifth harmonic (2.7 nm) enables FLASH to reach deep into the water window, which is crucially important for the investigation of biological samples. For more information, contact Petra Folkerts, Press officer XFEL project, FLASH, DESY. Phone: +49-40-8998-4977, Fax: +49-40-8998-2020, petra.folkerts@desy.de, <http://www.xfel.net>.

#### The 2006 Masao Horiba Awards: Y. Terada, H. Hayashi, K. Janssens and M. Ando (22 August, 2006)

HORIBA, Ltd has announced the prizewinners of the 2006 Masao Horiba Awards; Dr. Yasuko Terada, Japan Synchrotron Radiation Research Institute for 'Innovation and Application of X-ray Microbeam Fluorescence Analysis Using High-energy Radiation', Dr. Hisashi Hayashi, Japan Women's University for 'Development of New X-ray Spectrometry Using Resonant Inelastic X-ray Scattering', and Professor Koen Janssens, University of Antwerp, Belgium for 'X-ray Based Speciation of Major and Trace Constituents in Heterogeneous Materials of Environmental and Cultural Heritage Origin. In addition, Professor Masami Ando, Tokyo University of Science was selected as the winner of the Masao Horiba Special Award for 'Development of a System for Early Diagnosis of Breast Cancer'. The awards ceremony and a discussion session between the prizewinners and academic and research experts will be held at the Shiran Kaikan, Kyoto University on Tuesday, October 17. For more information, visit [http://www.jp.horiba.com/index\\_e.htm](http://www.jp.horiba.com/index_e.htm).

#### Second beamline now in operation at deep infrared FEL at Dresden (21 August, 2006)

At the Forschungszentrum Rossendorf (FZR) in Dresden, Germany, the second undulator of the free-electron laser facility has gone into operation, producing light up to the hard-to-access range of the deep far infrared. The Dresden FEL now covers the wavelength range, invisible to humans, from 3 to 150 micrometers. The asset of every free-electron laser is its tunability, i.e., the wavelength or the color of the light can be adjusted at will over a large range. Scientists at FZR have a particular interest in this far-infrared light, which is located between the ranges of microwaves and the infrared and is often called Terahertz (THz) radiation. At FZR, THz radiation is used in particular to study the dynamical behavior of electrons in semiconductor nanostructures. For more information, contact Annette Weissig, Phone +49-351-260-3688, [a.weissig@fz-rossendorf.de](mailto:a.weissig@fz-rossendorf.de), <http://www.fz-rossendorf.de/>.

#### Obituary—Neville Smith (18 August, 2006)

Neville Smith, Scientific Director for the Advanced Light Source of the Lawrence Berkeley National Laboratory and a leading authority in the field of photoemission spectroscopy, died on 18 August, 2006, at age 64, unexpectedly of cancer. A native of England with a PhD in physics from Cambridge University, he moved to the US in 1966. After post-doctoral research at Stanford University under photoemission spectroscopy pioneer William Spicer, he joined the staff at AT&T Bell Laboratories, and continued the study of the electronic structure of solids and surfaces for 25 years. In 1991, Dr Smith was awarded the prestigious Davison-Germer Prize of the American Physical Society for his contributions to the development of momentum-resolved

photoemission spectroscopy. In 1994, he was named as the first Scientific Program Head of the Advanced Light Source (ALS). Under his leadership, the ALS scientific program thrived. "It is not the number of warm bodies on the floor but the quality of science produced that is the true measure of a user facility's success" Dr. Smith once said. During his tenure as scientific director, the number of scientific users of the ALS grew from a few hundred to several thousand. There will be no funeral, but a memorial service to celebrate Dr Smith's life will be held in the fall.

## NEW PRODUCTS

### PANalytical introduces new PIXcel detector (7 August, 2006)

PANalytical has announced the release of the new PIXcel X-ray detector, which has more than 65 000 pixels, each 55 × 55 microns in size. Every pixel has individual readout circuitry giving a dynamic range of more than 25 million counts per second per pixel row. The use of beam attenuators is no longer necessary. The new detector can also be positioned behind conventional point detector optics. When used with a monochromator, it provides diffraction patterns with the best peak to background ratio for challenging materials. PIXcel is the result of PANalytical's collaboration with the European Organization for Nuclear Research (CERN) and other leading research institutes across Europe involved in the Medipix2 project. For further information, Phone: +31-546-534444, Fax: +31-546-534592, info@panalytical.com. <http://www.panalytical.com/>.

### Incoatec and Bruker AXS announce a novel microfocus X-ray source (7 August, 2006)

At the 23rd European Crystallographic Meeting, Incoatec GmbH, Hamburg, Germany, a manufacturer of X-ray optics, and Bruker AXS Inc., launched their novel I $\mu$ S X-ray microfocus source incorporating a 30 W micro-focus sealed tube together with high-performance Montel multilayer X-ray optics. For further information, contact Michael Willett, Investor Relations Officer, Phone: +1-978-663-3660, ext. 1411, ir@bruker-biosciences.com, <http://www.bruker-axs.de/>.

### Oxford releases two new X-ray detectors for microanalysis (31 July, 2006)

Oxford Instruments has announced the release of new two detectors, *INCAPentaFET-x3* and *INCAx-act*. *INCAPentaFET-x3* is a new Si(Li) detector, which has a 30 mm<sup>2</sup> detecting crystal, with the same resolution as a traditional 10 mm<sup>2</sup>. *INCAx-act* is an analytical drift detector, which combines the speed of silicon drift detector technology with the precision and accuracy of an external FET and digital pulse processing. For further information, contact Oxford Instruments Corporate Communications Manager, Lynn Sherherd, lynn.shepherd@oxinst.co.uk, <http://www.oxford-instruments.com/wps/wcm/connect/Oxford+Instruments/Internet/Home/>.

### Micro focus X-ray source jointly developed by PANalytical and Rigaku (22 July, 2006)

PANalytical B.V., a member of Spectris Plc, and Rigaku Innovative Technologies Inc., a subsidiary of Rigaku Americas Corporation, have announced the introduction of a 20  $\mu$ m focus X-ray source. The product was first shown at the 2006 meeting of the American Crystallographic Association 22–27 July in Honolulu, Hawaii. This new source is a stand-alone system, consisting of a sealed micro focus tube and generator from PANalytical, factory integrated and tested with a high performance X-ray optic designed and manufactured by Rigaku. The jointly developed X-ray source will be branded by the two companies separately, and integrated into their respective lines of analytical X-ray products. For further

information, Phone: +31-546-534444, Fax: +31-546-534592, info@panalytical.com, <http://www.panalytical.com>, or contact Catherine Klein, Senior Vice President, Rigaku Americas Corporation, Phone +1-281-363-1033 Ex124, Catherine.Klein@Rigaku.com, <http://www.rigakumsc.com/>.

## CORPORATE

### Bruker AXS acquires Quantron GmbH, a metals analysis company (8 September, 2006)

Bruker AXS Inc. has announced the acquisition of Quantron GmbH, located in Kleve, Germany. Quantron was established in June 2002 and develops, manufactures and distributes worldwide advanced arc/spark optical emission spectroscopy (OES) systems. The arc/spark OES market has been expanding significantly in recent years, and Quantron has grown very rapidly. After the acquisition, Bruker-Quantron GmbH will remain and expand in its Kleve location in order to provide leading stationary and mobile OES systems. Bruker AXS will contribute its global distribution, demonstration and service capabilities, as well as R&D and operating management assistance, to further accelerate the growth and profitability of Bruker-Quantron. For further information, contact Michael Willett, Investor Relations Officer, Phone: +1-978-663-3660, ext. 1411, ir@bruker-biosciences.com, <http://www.bruker-axs.de/>.

### Bede and IMEC collaborate on process control of new materials used at 45 nm nodes and below (25 August, 2006)

Bede X-ray Metrology has announced that it has entered into a collaboration with IMEC, a research centre in nanoelectronics and nanotechnology, headquartered in Leuven, Belgium, to investigate the use of X-ray metrology in the process control of new semiconductor materials used at the 45 nm technology node and below. For further information, visit <http://www.bede.co.uk>.

### Innov-X and A.P. Moller-Maersk in joint venture for vessel-based, real time oil, additive and fuel analysis (20 August, 2006)

Innov-X has announced a joint venture with the A.P. Moller-Maersk Group to supply XRF systems for on-board analysis of lubricants, fuels and related fluids. The Maersk fleet currently consists of over 1,000 vessels. The XRF analyzers are available in two versions, one for wear metals, sulfur content and blending applications, and the other for catalytic fines or 'catfines' (Si + Al) in residual fuels down to detection levels of 10 ppm typically. Both versions are certified for marine use by Det Norske Veritas (DNV). For more details, contact Carrie-Ann Doucette, Marketing Specialist at Innov-X Systems, Phone +1-781-938-5005, CDoucette@innov-xsys.com, or oil@innov-xsys.com, <http://www.innov-xsys.com>.

### Bruker AXS acquires KeyMaster Technologies (20 July, 2006)

Bruker AXS Inc. has announced the acquisition of all of the shares of KeyMaster Technologies Inc., located in Kennewick, Washington, which develops and manufactures portable hand-held X-ray fluorescence (XRF) systems. As a new Bruker AXS subsidiary, KeyMaster will remain in its current location, and will continue under its current name and management team in order to provide leading hand-held XRF systems and cutting-edge, miniaturized, lightweight X-ray technologies both to KeyMaster's present OEM customers, as well as to Bruker AXS. For further information, contact Michael Willett, Investor Relations Officer, Phone: +1-978-663-3660, ext. 1411, ir@bruker-biosciences.com, <http://www.bruker-axs.de/>.