

SYNCHROTRON LIGHT NEWS

NEWS

Magnetic molecules for information technology: single molecular magnets (February 2009). Scientists from France and Italy (M. Mannini *et al.*, "Magnetic memory of a single-molecule quantum magnet wired to a gold surface", *Nature Mater.* 8, 2009, 194) show, using X-ray absorption spectroscopy and X-ray magnetic circular dichroism synchrotron-based techniques, that the Fe₄ complexes retain magnetic hysteresis at gold surfaces. The study has been performed at the **SOLEIL** Synchrotron (Saint Aubin, France). (WP)

Contrast Material-enhanced Synchrotron Radiation Computed Tomography (CT) helps in fine mapping of glioma circulation (March 2009). D. Balvay *et al.* (*Radiology* 250, 2009, 692), representing eight scientific and medical institutions from France, demonstrate an interesting opportunity for application of synchrotron radiation to *in vivo* analyze the tumor zone organization. Classical computed tomography is unable to show dynamic processes that are important to understand the angiogenesis that takes place during tumor formation. Knowledge on these processes is very important from medical point of view. In this paper, the authors show that fine mapping of the glioma microcirculation is feasible through step-by-step imaging data analyses. The experimental part of the study was performed at **ESRF** synchrotron source. (WK)

Studies of plant cells using synchrotron radiation (April 2009). T Punshon, M.L. Guerinot and A. Lanzirrotti (*Annals of Botany* 103, 2009, 665) have reviewed the applications of synchrotron X-ray fluorescence microprobes in studies of plant cells. The method is concluded to be capable to provide fundamental information on plant cells (also in the *in-vivo* studies) in the sub-micrometer scale. (WP)

Kai Siegbahn prize¹ for Eli Rotenberg (September 2009). On September 30th, 2009, during the 10th International Conference on Synchrotron Radiation Instrumentation (Melbourne 2009), the winner of the 2009 Kai Siegbahn prize, Dr. Eli Rotenberg (Lawrence Berkeley National Lab., USA), was announced. A ceremony was organized on October 2nd, 2009 at the Dept. of Physics of the University of Uppsala where the laureate was invited. The prize was awarded for the creation of the ARPES "Electronic Structure Factory" end-station at the Advanced Light Source (USA) and its artful application to the understanding of quantum

electronic properties of nano-phase and reduced dimensionality materials. (WP)

Inauguration of the world's most brilliant synchrotron radiation source: Official starting shot for PETRA III (November 2009). The world's most brilliant and modern storage-ring-based synchrotron radiation source was officially inaugurated in November 2009 (the first X-ray beam was generated in May 2009). The facility will give unique opportunities for the studies of matter, including the nano and biomaterials. The total cost of the modernisation of PETRA II and the construction of the new experimental hall for PETRA III was 233 million EUR. (WP)

High reflectivity of synthetic diamond (January 2010). Y.V. Shvyd'ko *et al.* (High-reflectivity high-resolution X-ray crystal optics with diamonds, *Nature Phys.* 6, 2010, 196) demonstrate, using the data obtained at **NSLS** synchrotron source in US, the high reflectivity value of synthetic diamond crystals under Bragg condition and discuss the role of diamond for hard X-ray optics and for construction of elements of future free electron laser radiation sources. (WP)

Review of synchrotron-radiation methods applied to electrochemical systems (on line January 2010). An interesting review of structural characterization techniques applied for electrochemical systems using synchrotron-radiation appears in *TrAC Trends in Analytical Chemistry* (2010, in press). The researchers working in Australia, R. De Marco and J.-P. Vadera, demonstrate how various techniques can be useful in *in-situ* studies of batteries and fuel cells properties and what specialised tools are used in this field. (WP)

Iron containing sensory dendrites constitute an avian magnetometer system of birds (Feb. 2010). A team led by researchers from Frankfurt University in collaboration with HASYLAB/DESY, Univ. of Oldenburg, and Helmholtz-Zentrum Berlin discovered that iron containing sensory dendrites in the inner dermal lining of the upper beak are a candidate structure for an avian magnetometer system of birds. The physicochemical studies were performed at **DORIS III**, using microscopic X-ray absorption spectroscopy. The composition of the involved iron minerals in the dendrites is found to be identical in several bird species. For details see G. Falkenberg *et al.*, "Avian magnetoreception: elaborate iron mineral containing dendrites in the upper beak seem to be a common feature of birds". *PLoS ONE* 5 (2010) e9231. (WP)

Applications and trends in analytical chemistry using SR FT-IR microspectroscopy (on line March 2010). M.C. Martin *et al.* (*TrAC Trends in Analytical Chemistry*, 2010, in press) present an interesting review of applications and trends in analytical chemistry using synchrotron-based Fourier-transform IR spectromicrospectroscopy techniques. (WP)

¹ The aim of the Kai Siegbahn Prize is to recognize and encourage outstanding experimental achievement in synchrotron radiation research with a significant component of instrument development. Particular preference will be given to the development of synchrotron radiation spectroscopies.

Commercial table-top source operating in the 13–50 nm range (March 2010). I. Mc Kinnie and H. Kapteyn announced (*Nature Photonics* 4, 2010, 149) an introduction of a commercial table-top source operating in the range of 13–50 nm (extreme ultraviolet and soft x-rays). The principle of operation consists in high-harmonic generation of ultrafast Ti:Sapphire laser coupled with the extreme ultraviolet ultrafast source (XUUS) phase-matched high harmonics generation (HHG) gas capillary system. The 50 nm light is produced through the 15th harmonic, and 13 nm light through the 61st harmonic. The emission of 20 fs fully coherent pulses with a useful flux of 10¹² photons per second produces brightness comparable to that of a classical synchrotron sources making it possible to perform tasks previously accessible only using large-scale synchrotrons, with additional ability to perform time resolved experiments with femtosecond time resolution. (*JP*)

Copernicus Medal for Dr. Zbigniew Dauter (March 2010). In March 2010, Dr. Zbigniew Dauter from the Advanced Photon Source (Argonne National Laboratory, USA), received the Nicolaus Copernicus Medal, the highest distinction awarded by the Polish Academy of Sciences. The award recognizes Dr. Dauter's contribution to the development of protein crystallographic methodology involving synchrotron radiation. Zbigniew Dauter graduated from Gdańsk University of Technology, where he also obtained his PhD degree. His habilitation (DSc), was awarded by A. Mickiewicz University, Poznań. Dr. Dauter spent a number of years at several synchrotron centers (EMBL c/o DESY, Hamburg; NSLS, Brookhaven; APS, Argonne) conducting structural biological research and supervising external users of macromolecular crystallography beamlines. For details, see p. 28, this issue. (*MJ*)

Dr. Zbigniew Dauter during the award ceremony.

Photo: M. Mlekicki



Polish synchrotron project accepted (April 2010). On 9th of April 2010, Minister of Science and Higher Education Prof. Barbara Kudrycka and Rector of Jagellonian University Prof. Karol Musioł, signed the Polish Synchrotron Project. According to the schedule, the machine will be built at the new Jagellonian University Campus and commissioned in September 2014. See p. 1 (this issue) for details. (*MS*)

Phosphorus in the cell can be quantified (July 2010). D.R. Núñez-Milland, S.B. Baines, S. Vogt and B.S. Twining show ("Quantification of phosphorus in single cells using synchrotron X-ray fluorescence", *Synchrotron Rad.* 17, 2010, in print) that phosphorus, an important component of the cell, can be quantified using

synchrotron X-ray fluorescence (SXRF). The authors discuss also the importance of choice of the standard used in this study. (*WP*)

FUTURE CONFERENCES & WORKSHOPS

Polish Crystallographic Conversatorium (June 2010). 52nd "Konwersatorium Krystalograficzne" will be held on 24-25 June 2010 r., followed by a Meeting and Workshop of Polish Crystallographic Society (25-26 June 2010), <http://komkryst.int.pan.wroc.pl/kk2010/kk2010.htm>.

Free Electron Laser Meeting (August 2010). 32nd International Free Electron Laser Conference will be organised on 23-27.08.2010 in Malmö (Sweden). <http://www.maxlab.lu.se/maxlab/conference/fel2010/index.html>.

European crystallographic conferences (August & September 2010) ECM-26, 26th European Crystallographic Meeting (Aug. 29 - Sept. 2, 2010) and EPDIC-12, 12th European Powder Diffraction Conference (Aug. 27-30), both will be held in Darmstadt, Germany.

Synchrotron Radiation Instrumentation Meeting (September 2010). The Sixteenth Pan-American Synchrotron Radiation Instrumentation (SRI) Conference, is planned for 21-24.09.2010, Argonne, IL (USA).

DISCUS nanoparticle modeling workshop (September 2010). DISCUS nanoparticle modeling workshop is organized from Sept. 23 to Sept. 26, 2010 in Erlangen (Germany). Details are available at <http://discus.sourceforge.net>.

Workshop on Extreme Condition Studies using Synchrotron Radiation and Neutrons (September 2010). A workshop "Synchrotron Radiation and Neutrons for Extreme Condition Studies" (Hercules Specialised Course, HSC12) will be organized in Grenoble, 27th Sept. to 2nd Oct, 2010.

MAXlab User Meeting (November 2010). MAX-lab 23rd Annual User Meeting, will be held in Lund, Sweden, November 8 - 10, 2010.

International Conference on X-ray Absorption Fine Structure, Beijing, China (2012). The 15th International Conference on X-ray Absorption Fine Structure (XAFS15) will be held in Beijing, China, in 2012. It is hosted by Institute of High Energy Physics, Chinese Academy of Sciences. The scope of the conference aims at XAFS and all the related techniques and topics. <http://www.xafs15.org/>.

More news at: <http://www.lightsources.org/cms/>.

News in this issue were prepared by: M. Jaskólski (MJ), A. Mickiewicz University; Marek Stankiewicz (MS), Jagellonian University; W. Paszkowicz (WP), Institute of Physics PAS; Jerzy B. Pelka (JP), Institute of Physics PAS; W. Kwiatek (WK), Institute of Nuclear Physics PAS.

