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Current issue online at http://www-als.lbl.gov/als/als_news/

1. DIRECTOR'S UPDATE: SAC MEETING, THE BUDGET, BES REVIEW, AND BEYOND
by Roger Falcone

(Contact: RWFalcone@lbl.gov)

This has been a busy period at the ALS, as we adjust to a reduced Fiscal-Year 2008 budget and prepare for the triennial U.S. Department of Energy (DOE) Office of Basic Energy Sciences (BES) review of our facility that will take place March 4-6.

In December, we presented our Scientific Advisory Committee (SAC) with a dry run of the material for the BES review, reports on progress and successes of the past three years, and our vision as we move forward in 2008 and beyond. The SAC provided valuable feedback, which we are incorporating into the materials being prepared for our review.

Immediately after the SAC meeting, we held a focused, international workshop on High Average Power Lasers and High Harmonics and explored the state of such lasers for generating soft x-rays and seeding a next-generation, free-electron-laser-based soft x-ray source. This workshop was part of a continuing series sponsored by the Laboratory's Advanced Photon Science Initiative to examine how new technologies can help us meet the science requirements outlined in the BES Grand Challenges. (See <http://www.sc.doe.gov/bes/reports/list.html> for a copy of the Grand Challenges report, which will help inform research directions at BES.)

Then in late December, the FY08 omnibus funding bill was announced, and federal science agencies received news of significant cuts in the President's proposed budget, and we were informed of consequent reductions in ALS funding. The scientific societies (e.g., the American Physical Society) encouraged all members, including users of facilities, to contact their

congressional representatives, senators, and the White House to convey their concerns about the impact of the budget.

As we continue preparations for our BES review, I want to thank all of you who responded to our requests to update publications lists, awards, and invited talks based on work carried out at the ALS. Our productivity over the last three years, which is the primary metric, has been extraordinarily high. But the reviewers will also want to hear how we plan to keep the ALS at the scientific forefront. With the present budget, this is a challenge--one that we share with the other light sources.

Our plans include continuing our successful efforts toward full top-off mode, and a careful review and optimization of our current allocation of resources. Big questions include, how do we grow critical program areas, such as enhanced metrology/optics and more capable detectors, while also focusing on our mission, our core capabilities, and our most scientifically productive beamlines? One of our goals is to continue to hire young people with great ideas through our postdoctoral program, to make sure that our next generation of scientists gets trained. I am confident that the cuts in federal science budgets will eventually be restored, so we also need to continue planning for new areas of science and technology that we believe will be important.

Berkeley Lab recognizes that the ALS doesn't only serve the needs of its users; it plays a key role in the broader dissemination of science and technology. So despite the difficult financial situation, I'm happy to say that the Laboratory has given us funds to improve the ALS lobby area so that we can better communicate this role to our visitors, ranging from school groups to political leaders. These improvements will be completed by the beginning of March.

Several of our major construction projects also have been affected by the budget cuts--including proposals for the renewal of Sector 7, called COSMIC and MAESTRO (declined along with all BES midscale instrumentation proposals this year) and the User Support Building (USB). Although the USB is still going forward, its completion date has been moved from 2009 to 2010/2011.

I am planning to go to Washington in February to visit BES, as budget allocations are made clearer, to explore ways to mitigate the most damaging cuts for ALS. Our support from BES remains strong, and we will continue to work with our funding agency and our users to most effectively use our resources, both current and future.

2. THE BIOLOGICAL IMPLICATIONS OF THE PP2A CRYSTAL STRUCTURE (Contact: Wenqing Xu, wxu@u.washington.edu)

Phosphatases, enzymes that remove a phosphate group from amino-acid substrates, can be subdivided according to their substrate specificity. Myriad evidence has demonstrated that protein phosphatase 2A (PP2A), a family of serine/threonine-specific (Ser/Thr) phosphatases, regulates many, if not most, aspects of cellular activities and is a critical tumor suppressor. A team at the University of Washington recently determined the first crystal structure of a PP2A holoenzyme (a form sufficient for full catalytic activity) composed of three different subunits

(i.e., a heterotrimer). Their structure provides a foundation for understanding PP2A regulation, satisfactory mechanistic explanations for human tumorigenic mutations, and the structural basis for understanding PP2A substrate recruitment and specificity, a critical issue, given the high number of PP2A substrates.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/157pp2a-crystal.html

Publication about this research: U.S. Cho and W. Xu, "Crystal structure of a protein phosphatase 2A heterotrimeric holoenzyme," *Nature* 445, 83 (2007).

3. IMPORTANT TOP-OFF PROGRESS

(Contacts: David Robin, DSRobin@lbl.gov, and Christoph Steier, CSteier@lbl.gov)

The ALS made a big step towards the successful completion of the top-off upgrade during November and December of 2007. The recommissioning of the injector complex was successfully completed and user operation was moved from injection at 1.5 GeV to full-energy injection at 1.9 GeV. Although all the hardware installations for this upgrade were completed at the end of 2006, the new power supply for the booster dipole chain failed during the final testing conducted by the vendor. This caused several days' delay in user startup in January 2007 and subsequently limited performance. A successful collaborative effort between the vendor and ALS engineers during the Thanksgiving shutdown in November resolved the problem.

The first beam operation of the booster synchrotron at up to 1.9 GeV occurred on December 3. During the following week, injection rates into the storage ring were improved, and full-energy injection became standard on December 11.

An immediate benefit of full-energy injection is that transients in air and cooling water temperatures--previously caused by the change in magnet currents for injection--disappeared, resulting in better stability of the accelerator. The goal in the coming months is to slowly increase the peak stored current to 500 mA and reduce the time necessary for refills from 20 minutes to below 10 minutes. This would make it possible to inject more often than the current schedule of eight hours between refills and could result in a significant increase in average flux and brightness even before full top-off operation. Migrating to full-energy injection concludes the major hardware part of the top-off upgrade of the ALS.

4. UEC CORNER: INTRODUCING THE 2008 COMMITTEE

by Hendrik Ohldag

(Contact: Hendrik Ohldag, hohldag@stanford.edu)

I am very happy to introduce this year's ALS Users' Executive Committee (UEC). The 11 members are listed below, and you can find their contact information at <http://www-als.lbl.gov/als/uec/UECcontacts.html>. As a group, we represent you--the ALS users--and your interests to the ALS management and funding agencies. In this role, we listen to your concerns

and suggestions and rely significantly on your input. Please do not hesitate to contact any one of us if you want to bring an issue to our attention that concerns the ALS user community or your work at the ALS. I would also like to thank last year's UEC chair, Tony van Buuren, as well as Jinghua Guo and Simon Morton, who rotated off the UEC, for their contributions. Simon will remain on the UEC in a consulting capacity as a member of the User Support Building Committee and contact person for the protein crystallography community.

As Roger mentions in his Director's Update, the ALS--along with many other national facilities--is facing severe challenges due to the FY08 budget cuts. We will work closely with ALS management to minimize the impact of those cuts on your research programs.

Despite the budgetary situation, 2008 features two high points for the ALS. First, we will have the opportunity to present the excellent work that is performed at the ALS to a DOE Basic Energy Sciences review committee that will visit Berkeley at the beginning of March. Every three years the DOE reviews all of its synchrotron facilities to obtain an overview of their programs and their user communities.

We are also looking forward to the 2008 ALS Users' Meeting. This meeting is the highlight for the UEC each year because it gives us the opportunity to gather the user community together and provide a forum to exchange ideas and experiences. The 2008 Users' Meeting program will be organized by Wayne Stolte and Phil Heimann, with the experienced support of the ALS User Services Office. Although we will not be having a joint meeting with the Molecular Foundry, as we did last year, we are discussing the possibility of doing so in the future. Again, we ask for your input on this important issue so that we can act in your interests.

We are looking forward to working for you in 2008.

2008 ALS UEC members:

Hendrik Ohldag (chair), Stanford Synchrotron Radiation Laboratory (2006-08)

Yves Acremann, Stanford Linear Accelerator Center (2008-10)

Elke Arenholz, ALS (2006-08)

Peter Fischer, Center for X-Ray Optics, Berkeley Lab (2007-09)

Kenneth Goldberg, Center for X-Ray Optics, Berkeley Lab (2007-09)

Phil Heimann, ALS (2008-10)

Franz Himpsel, University of Wisconsin, Madison (2007-09)

Alessandra Lanzara, University of California, Berkeley; Materials Sciences Division, Berkeley Lab (2006-08)

Anne Sakdinawat (student), Materials Sciences Division, Berkeley Lab: University of California, Berkeley (2008-10)

Wayne Stolte, ALS (2008-10)

Tony van Buuren (past chair), Lawrence Livermore National Laboratory (2005-07)

5. SAC YEAR-END REVIEW AND BES DRY RUN

(Contact: RWFalcone@lbl.gov)

The ALS Scientific Advisory Committee (SAC) meeting on December 10 and 11 was extremely valuable, with preparation for the March 4-6 BES review as the keynote agenda item. In addition to Facility talks, Committee members attended two poster sessions out on the ALS Floor, which were given as a dry run for the BES Review. SAC came up with very useful suggestions to help us prepare. In addition to the BES preparation, there were talks on detectors, nanomagnetism, the HELIOS project, and protein crystallography, and the Science for a New Class of Soft X-Ray Light Sources Workshop. All in all, it was a very valuable meeting.

6. ALS-RELATED WEB NEWS AND LINKS

How cagey electrons keep hydrated

<http://www.physorg.com/news117389608.html>

Researchers uncover key trigger for potent cancer-fighting marine product

<http://www.lightsources.org/cms/?pid=1002557>

First look at an enzyme target for antibacterial and cancer drugs

<http://www.lbl.gov/Science-Articles/Archive/PDB-Topo-II.html>

Falling into the gap: Berkeley Lab researchers take a critical first step toward graphene transistors

<http://www.lbl.gov/Science-Articles/Archive/sabl/2007/Nov/gap.html>

A new kind of particle detector using silicon-on-insulator chips

<http://www.lbl.gov/today/2007/Dec/06-Thu/battaglia-jump.html>

Monster Protein Found:

Structural snapshot shows monster protein

<http://www.rsc.org/chemistryworld/News/2007/December/05120702.asp>

Structure of largest nonvirus particle ever crystallized modeled

<http://www.sciencedaily.com/releases/2007/11/071126201401.htm>

7. OPERATIONS UPDATE

(Contact: Dave Richardson, DBRichardson@lbl.gov)

For the user runs scheduled between November 28, 2007, and January, 20, 2008, the beam reliability (time delivered/time scheduled) was 93.8%. Of the scheduled beam, 89.9% was delivered to completion.

As of mid-December 2007, storage ring injection is being performed at 1.9 GeV (instead of the familiar 1.5 GeV). This is a significant step toward top-off mode. (As of the third week in January 2008, injection efficiency at 1.9 GeV has been very encouraging.)

Long-term and weekly operations schedules are available on the Web at <http://www-als.lbl.gov/als/schedules/index.html> . Requests for special operations use of the "scrubbing" shift should be sent to Rick Bloemhard (ALS-CR@lbl.gov, x4738) by 1:00 p.m. Friday. A Web page showing the ring status in real time can be found at <http://www-als.lbl.gov/als/status/> .

ALSNews is a monthly electronic newsletter to keep users informed about developments at the Advanced Light Source, a national user facility located at Ernest Orlando Lawrence Berkeley National Laboratory, University of California. The current and past issues of ALSNews are available on the World Wide Web. Point your browser to the following URL:

http://www-als.lbl.gov/als/als_news/

To subscribe, unsubscribe, or change your delivery address for the email version of ALSNews, send a message indicating your wishes and including your name and email address to alsnews@lbl.gov. We welcome suggestions for topics and content.

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Editors: jmccullough@lbl.gov, Istamura@lbl.gov, ejmoxon@lbl.gov

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Current issue online at http://www-als.lbl.gov/als/als_news/

1. DIRECTOR'S UPDATE: ALS RESPONSE TO FY08 BUDGET

by Roger Falcone

(Contact: RWFalcone@lbl.gov)

As you have heard, the fiscal year 2008 (FY08) federal budget for science is considerably lower than was originally predicted, and at several national laboratories the consequences have been severe.

At the ALS, we received FY08 funding that will require significant belt tightening. Last week, I visited our program managers at the Department of Energy (DOE), Office of Basic Energy Sciences (BES), and they are as concerned as we are by the cutbacks that will need to be taken at facilities and in programs. There is some hope that the FY09 budget, as announced, will increase funding for science, but the funds lost this year cannot be recovered.

We have been exploring a variety of options in response to the situation, and our current plan for dealing with the budget shortfall at the ALS includes the following:

- (1) We will likely shut down the synchrotron for six weeks starting September 1. Of course, we will take the best advantage of this shutdown by working on ALS-related projects.
- (2) To consolidate our efforts, we will cut back on running some bend-magnet beamlines that are not strongly oversubscribed.
- (3) For now, there is a freeze on new hiring.

We will also be sharing these plans and concerns with the visiting committee at the upcoming DOE review of the ALS on March 4-6. Comments and input from the entire ALS community is of course desired at all times, but is particularly welcome in difficult times such as these.

2. UEC CORNER: LOOKING FORWARD TO THE BES REVIEW AND BEYOND

by Hendrik Ohldag

(Contact: Hendrik Ohldag, hohldag@stanford.edu)

The Users' Executive Committee (UEC) is currently preparing for the triennial review of the ALS by the Department of Energy, Office of Basic Energy Sciences. The reviewers will meet with the UEC to learn more about ALS users and their needs. We will do our best to provide the reviewers with a representative overview of the ALS user community. Soon, we will start preparations for the 2008 ALS Users' Meeting. This year's program will be organized by Wayne Stolte (UNLV/ALS) and Phil Heimann (ALS). We are very much looking forward to the meeting, which is the annual highlight of the schedule for the ALS Users' Association. Please feel free to contact us if you have any suggestions regarding the meeting. Later this year, we will solicit your contributions and ask for your help in putting together another excellent selection of workshops.

3. TOPO II: AN ENZYME TARGET FOR ANTIBACTERIAL AND CANCER DRUGS

(Contact: James Berger, jmberger@berkeley.edu)

The veil has finally been lifted on an enzyme that is critical to the process of DNA transcription and replication and is a prime target of antibacterial and anticancer drugs. Researchers at Berkeley Lab and the University of California, Berkeley, have produced the first three-dimensional structural images of a DNA-bound type II topoisomerase (topo II) that is responsible for untangling coiled strands of the chromosome during cell division. Preventing topo II from disentangling a cell's DNA is fatal to the cell, which is why drugs that target topo II serve as agents against bacterial infections and some forms of cancer. This first-ever structural image of topo II should help in the development of future antibacterial and anticancer drugs that are even more effective and carry fewer potential side effects.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/160topoII.html

Publication about this research: K.C. Dong and J.M. Berger, "Structural basis for gate-DNA recognition and bending by type IIA topoisomerases," *Nature* 250, 1201 (2007).

4. THE H₂ DOUBLE-SLIT EXPERIMENT: WHERE QUANTUM AND CLASSICAL PHYSICS MEET

(Contact: Thorsten Weber, TWeber@lbl.gov)

For the first time, an international research team carried out a double-slit experiment in H₂, the smallest and simplest molecule. Thomas Young's original experiment in 1803 passed light through two slits cut in a solid thin plate. In the groundbreaking experiment performed at ALS Beamlines 4.0 and 11.0, the researchers used photoelectrons instead of light and the nuclei of the hydrogen molecule as the slits. The experiment revealed that only one "observing" electron suffices to induce the emergence of classical properties such as loss of coherence.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/158slit.html

Publication about this research: D. Akoury, K. Kreidi, T. Jahnke, Th. Weber, A. Staudte, M. Schöffler, N. Neumann, J. Titze, L. Ph. H. Schmidt, A. Czasch, O. Jagutzki, R. A. Costa Fraga, R. E. Grisenti, R. Díez Muiño, N. A. Cherepkov, S. K. Semenov, P. Ranitovic, C. L. Cocke, T. Osipov, H. Adaniya, J. C. Thompson, M. H. Prior, A. Belkacem, A. L. Landers, H. Schmidt-Böcking, R. Dörner, "The simplest double slit: Interference and entanglement in double photoionization of H₂," *Science* 318, 949 (2007).

5. REGISTER NOW FOR THE 2008 BEAM INSTRUMENTATION WORKSHOP

(Contact: Grace Covarrubias, biw08@lbl.gov)

The 2008 Beam Instrumentation Workshop (BIW08) will be held at the Granlibakken Conference Center and Lodge at Lake Tahoe, California, May 4-8, 2008. Sponsored by Lawrence Berkeley National Laboratory, the workshop will be dedicated to exploring the physics and engineering challenges of beam diagnostic and measurement techniques for charged particle accelerators. The meeting will feature

- plenary and poster sessions,
- tutorials,
- vendor exhibits,
- multiple opportunities for informal discussions and collaborations, and
- presentation of the 2008 Faraday Cup Award, sponsored by Bergoz, Inc., France.

Information about the meeting, including an updated agenda, abstract submission guidelines, lodging and tourism details, and online registration, is available at the BIW08 Web site (<http://www-als.lbl.gov/biw08/index.html>).

6. ALS-RELATED WEB NEWS AND LINKS

Possible Breakthrough for Sufferers of Huntington's
<http://canadafreepress.com/index.php/article/1728>

Breaking Down Huntington's Disease One Protein at a Time
<http://www.sciencedaily.com/releases/2008/02/080204111749.htm>

DOE's Disappointing Budget Makes It Harder to Stick to the Basics
<http://www.sciencemag.org/cgi/content/summary/319/5863/554>

7. OPERATIONS UPDATE

(Contact: Dave Richardson, DBRichardson@lbl.gov)

For the user runs scheduled between January 23 and February 17, 2008, the beam reliability (time delivered/time scheduled) was 84.3%. Of the scheduled beam, 77.1% was delivered to completion.

Two separate problems were responsible for most of the beam time lost: (1) failure of a controller card for the new booster bend power supply and repair of same; and (2) failure of a current-reference circuit of the storage ring gradient power supply and repair of same.

Long-term and weekly operations schedules are available on the Web at <http://www-als.lbl.gov/als/schedules/index.html> . Requests for special operations use of the "scrubbing" shift should be sent to Rick Bloemhard (ALS-CR@lbl.gov, x4738) by 1:00 p.m. Friday. A Web page showing the ring status in real time can be found at <http://www-als.lbl.gov/als/status/> .

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http://www-als.lbl.gov/als/als_news/

To subscribe, unsubscribe, or change your delivery address for the email version of ALSNews, send a message indicating your wishes and including your name and email address to alsnews@lbl.gov. We welcome suggestions for topics and content.

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1. IN MEMORIAM: DANIEL CHEMLA
ALS DIVISION DIRECTOR, 1998-2005

Daniel Chemla, former director of the ALS and Materials Sciences Divisions and major intellectual driver in the establishment of the Molecular Foundry, died at home on Thursday, March 20, at the age of 67. He had been battling a series of health problems since suffering a stroke four years ago. Despite those difficulties, he continued to actively lead his research group until very recently.

As ALS Division Director, Daniel's ambitious 20-year roadmap for the ALS laid the groundwork for new beamlines, accelerator upgrades, and expanded scientific programs in materials sciences, ultrafast science, microscopy, and protein crystallography. During his seven-year tenure at the ALS, the number of users grew from 659 to over 2000. He stepped down as director in 2005. Acknowledging Daniel's extraordinary contributions to the ALS, current ALS Director Roger Falcone observed, "He was a visionary and tireless leader. He set the ALS on a path of frontier science that we continue today, as was pointed out explicitly in the recent BES review. As a teacher and researcher, Daniel was inspirational for his students and colleagues. Along with his extensive network of friends, I will greatly mourn his passing, while appreciating his extraordinary life."

Daniel is survived by his wife Berit, two children, Yann, an assistant professor of physics at the University of Illinois, Urbana-Champaign, and Britt Chemla Jones, an art history lecturer in Houston, Texas. The family is planning a memorial to honor him in the near future.

To read the full obituary from Berkeley Lab, go to <http://www.lbl.gov/today/2008/Mar/21-Fri/chemla-jump.pdf> . View images [<http://ssg.als.lbl.gov:16080/chemla65/gallery.html>] of Daniel's career that were shown at the Molecular Nanoscience Workshop [<http://ssg.als.lbl.gov:16080/chemla65/index.html>], held in honor of his 65th birthday, on November 21, 2005.

2. DIRECTOR'S UPDATE: THE BES REVIEW COMMITTEE COMES TO THE ALS

by Roger Falcone

(Contact: RWFalcone@lbl.gov)

The triennial ALS Basic Energy Sciences (BES) program review was held on March 4-6, 2008. Laboratory Director Steven Chu was on hand to welcome the Review Committee and DOE representatives to the facility. The review process gave us an opportunity to demonstrate how we accomplish our mission--to support users in doing outstanding science in a safe environment. We highlighted the research performed at the ALS, our business practices, and our renewal plans for the storage ring and beamlines. Initial comments from committee members revealed their admiration for the work of our staff and users, but we await a full report from BES.

Six ALS users gave presentations on their innovative and groundbreaking research. On Tuesday (March 4), Andrea Cavalleri of Oxford University gave a presentation on "Dynamics in Complex Solids Viewed with Femtosecond X Rays," Zhi-Xun Shen of Stanford University spoke on "Photoemission Study of Novel Materials," Eli Rotenberg of the ALS talked about "ARPES Studies of 'Continuously-Doped' 2-Dimensional Correlated Materials," James Berger of UC Berkeley started off the Wednesday session with a presentation on "Nature's Magicians: Understanding Type II Topoisomerases," followed by Craig Taatjes of Sandia National Laboratory, who spoke on "Imaging" Combustion Chemistry with Multiplexed Synchrotron-Photoionization Mass Spectrometry," and Yves Acremann of Stanford, who gave a presentation on "Magnetization Dynamics: Ultrafast and Ultrasmall." Other presentations were given by ALS staff and included "Engineering and Operations (Peter Denes and David Robin), "Resources and Allocations" (Ben Feinberg), "Safety" (Jim Floyd), "Accelerator Science for ALS Renewal" (David Robin), "Development of Beamlines and Instrumentation for the ALS Science Program" (Howard Padmore), and "Opportunities for Soft X-Ray Science at the ALS: Present and Future" (Zahid Hussain). In addition, breakout sessions occurred on all three days, a poster session with over 50 posters was given on Tuesday evening, and a walkthrough of the facility was provided on Wednesday afternoon.

3. SUBSTRATE-INDUCED BAND-GAP OPENING IN EPITAXIAL GRAPHENE

(Contact: [Alessandra Lanzara, ALanzara@lbl.gov](mailto:ALanzara@lbl.gov))

Prospective challengers to silicon, the long-reigning king of semiconductors for computer chips and other electronic devices, have to overcome silicon's superb collection of materials properties as well as sophisticated fabrication technologies refined by six decades of effort by materials scientists and engineers. Graphene, one of the latest contenders, has a rather impressive list of

features of its own but has lacked a key characteristic of all semiconductors, an energy gap (band gap) in its electronic band structure. A multi-institutional collaboration under the leadership of researchers with Berkeley Lab and the University of California, Berkeley, have now demonstrated that growing an epitaxial film of graphene on a silicon carbide substrate results in a significant band gap, 0.26 electron volts (eV), an important step toward making graphene useful as a semiconductor.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/159bandgap.html

Publication about this research: S.Y. Zhou, G.H. Gweon, A.V. Fedorov, P.N. First, W.A. De Heer, D.H. Lee, F. Guinea, A.H. Castro Neto, and A. Lanzara, "Substrate-induced bandgap opening in epitaxial graphene," *Nature Materials* 6, 770 (2007).

4. THE ALS X-RAY STREAK CAMERA: BRINGING THE ULTRAFAST AND THE ULTRASMALL INTO FOCUS

(Contact: Jun Feng, FJun@lbl.gov)

Studying the world of the ultrasmall and the ultrafast is at the frontier of scientific research. Two x-ray approaches can be used for such examination. The first entails developing sources that have short x-ray pulses such as free-electron lasers and slicing sources, which will provide the ultrafast temporal information. The other approach is to develop a detector that is fast enough to resolve the ultrafast details of the dynamical processes. ALS researchers are doing both: developing sources and detectors with one instrument. They are developing a high-speed x-ray streak camera with high spatial resolution to watch, in real time, the motion of the atoms in materials. So far, a temporal resolution of 233 fs and a spatial resolution of 10 microns have been demonstrated. This is the first time that such a high temporal resolution has been combined with high spatial resolution in a streak camera. Full story.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/161streakcamera.html

Publication about this research: J. Feng, H.J. Shin, J.R. Nasiatka, W. Wan, A.T. Young, G. Huang, A. Comin, J. Byrd, and H.A. Padmore, "An x-ray streak camera with high spatio-temporal resolution," *Appl. Phys. Lett.* 91, 134102 (2007).

5. FORMATION OF METALLIC COPPER NANOPARTICLES AT THE SOIL-ROOT INTERFACE

(Contact: A. Manceau, Alain.Manceau@ujf-grenoble.fr)

The first commercial fungicide--the "Bordeaux mixture" of copper sulfate and Lime--was used to fight downy mildew in French vineyards. The fungicide worked by catalyzing the production of free radicals that damage proteins and enzymes involved in cycling copper between Cu(I) and Cu(II) oxidation states in the cellular electron transport chain. However, not all fungi are

sensitive to copper toxicity. Some, called mycorrhizae, which live underground in symbiosis with host plants through intracellular or extracellular colonization of their roots, are resistant, although it is not known why. A team from France's National Center for Scientific Research (CNRS) and Université Joseph Fourier in Grenoble in collaboration with researchers at the University of Illinois at Chicago and in partnership with the French company PhytoStore has discovered a new form of copper--metallic nanoparticles--in the rhizosphere (soil-root interface) that may explain how mycorrhizal (symbiotic) fungi detoxify copper.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/162copper.html

Publication about this research: A. Manceau, K.L. Nagy, M.A. Marcus, M. Lanson, N. Geoffroy, T. Jacquet, and T. Kirpichtchikova, "Formation of Metallic Copper Nanoparticles at the Soil-Root Interface," *Environmental Science and Technology* 42, 1766 (2008).

6. MERLIN BEAMLINE RECEIVES FIRST LIGHT

On Monday, February 25, MERLIN (meV Resolution Beamline—Beamline 4.0.3) began its commissioning stage with the achievement of first light through its front-end optics. This project completes the development of the chicane Sector 4 straight section and was funded by the office of Basic Energy Science (BES), Department of Energy (DOE), in response to strong demand for an ultrahigh energy resolution beamline to tackle the challenges in strongly correlated electron physics.

Two separate experimental techniques will be utilized at the beamline: angle-resolved photoemission spectroscopy (ARPES) and resonant inelastic x-ray scattering spectroscopy (RIXS). ARPES is a photon-in/electron-out spectroscopy, which can be used to directly study single-particle (quasiparticle) ground-state properties and important electron-boson interactions. RIXS, on the other hand, is a photon-in/photon-out spectroscopy, which is used to study two-particle (electron-hole) properties. Charge-neutral transitions allow the experiments to be carried out under applied fields, and the resonance effect provides elemental selectivity and greatly enhances weak excitations. The unique combination of ARPES and RIXS offers an opportunity to study the electronic structures of complex systems.

The beamline design was quite challenging and employs a number of novel features and developments to deliver both world-class energy resolution ($R \sim 100,000$) and robust, user-friendly operations. Starting at the source, MERLIN utilizes a quasi-periodic, 9-cm-period elliptically polarizing undulator (EPU) to cover its operational energy range of 8 to 150 eV while simultaneously shifting higher harmonics to minimize their transmission through the monochromator. This light is then focused through a series of optics to a fixed entrance slit and onto a translating spherical grating monochromator (SGM) that contains a flat premirror and two separate spherical grating substrates (one for high flux, one for high resolution). The exit slit is also stationary, and the monochromator can either be translated to maintain a high-resolution focus or fixed and operated in variable included angle (VIA) mode. Finally, the selected beam is refocused at the sample by a Kirkpatrick-Baez (KB) arrangement of mirrors that features side-

contoured and bent optic substrates with a theoretical 0.1 microradian figure deviation from ideal elliptical form. This high-quality focusing will allow the spectrometer to operate at maximum resolution in a high-flux, slitless configuration.

MERLIN's success is due to the teamwork of the following individuals: Nicholas Kelez, Derek Yegian, Frederic Gicquel, Troy Stevens, Tom Miller, Alexis Smith-Baumann, Keith Franck, and Rob Duarte (Beamline Design Team); Steve Marks, Ross Schlueter, Soren Prestemon, and Mark Coleman (Undulator Design); Ruben Reinniger, Yi-De Chuang, John Bozek, and Malcolm Howells (Optical Design); and Yi-De Chuang, M. Zahid Hasan, Alessandra Lanzara, and Zahid Hussain (Scientific Team).

Currently, commissioning of the upstream components continues as the beamline awaits the arrival of the remaining optics. The first high-resolution experiments will take place in early summer.

7. PAULO MONTEIRO WINS KAUST GLOBAL RESEARCH PARTNERSHIP AWARD

King Abdullah University of Science and Technology (KAUST) announced on March 13 the names of the winners of its Global Research Partnership (GRP) Investigator competition. Paulo Monteiro--ALS User and University of California, Berkeley, Professor of Civil and Environmental Engineering--was one of the 12 international scientists who were selected as KAUST Investigators for the 2007 round of nominations, which featured more than 60 submissions from 38 of the world's leading research universities. The awardees are dedicated to a wide range of research topics of global significance with particular importance to Saudi Arabia and the region. Their research areas include water desalination, renewable and sustainable next-generation energy sources, genomics of salt-tolerant plants, durable and environmentally friendly construction materials, sustainable utility of hydrocarbons, low-cost high-efficiency solar technology, and the application of computational science to human health and biotechnology.

8. SAVE THE DATES: 2008 ALS USERS' MEETING (Contact: alsum@lbl.gov)

It's not too early to mark your calendar for this year's ALS Users' Meeting, to be held at Berkeley Lab, October 13-14. Organizers are already planning an exciting program of highlight talks, poster sessions, and workshops. Anyone interested in proposing a workshop topic can contact the organizers at alsum@lbl.gov.

9. BULLETIN BOARD

New ALS Lobby Look

The ALS Lobby has recently undergone a "makeover" in order to better showcase ALS science and engineering to visitors. The first stage of the redesign--installation of a new science highlight display area, banners, and signage--was completed at the end of February, just in time for the

triennial BES Review. The next step will be to create content for a flat-screen display that will provide tour guides and visitors with an introduction to the ALS, an overview of recent science highlights, and facility information. The renovation project was funded by the Berkeley Lab Directorate and spearheaded by the ALS Communications group [alscommunications@lbl.gov]. Go to <http://www-als.lbl.gov/als/news/lobbyUpgrade.html> to view images of the Lobby upgrade.

Send Us Your Highlights

(Contact: alscommunications@lbl.gov)

ALSNews, with a readership of over 4,000, reaches the synchrotron community, Department of Energy funders, scientists in other disciplines, and a wide array of general audience readers. Each month we feature science highlights from ALS users. Help us to help you highlight your ALS research by contacting us as soon as a paper has been accepted for publication so that we may consider it for an ALS highlight. We are especially interested in high-profile journal publications (Nature, Science, PRL, and Cell) as well as general-interest topics. These highlights not only appear in ALSNews, but on posters and ALS print publications. In addition, decision-makers at the DOE receive ALS highlights in viewgraph form for use in presentations. If you would like your work to be highlighted, send an email containing the publication citation and a brief description of the work.

10. ALS-RELATED WEB NEWS AND LINKS

How Iron Gets into the North Pacific

<http://www.lbl.gov/Science-Articles/Archive/ESD-NP-iron.html>

Important Hearing on FY 2009 Office of Science Request

<http://www.aip.org/fyi/2008/037.html>

Vaccine Against "Strep Throat" Possible: Study

<http://www.reuters.com/article/rbssHealthcareNews/idUSN0621929820080306>

Paths of ALS Scientists Cross Over Cancer Drug

<http://www.lbl.gov/today/2008/Mar/13-Thu/03-13-08.html>

11. OPERATIONS UPDATE

(Contact: Dave Richardson, DBRichardson@lbl.gov)

For the user runs scheduled between February 20 and March 16, 2008, the beam reliability (time delivered/time scheduled) was 96.0%. Of the scheduled beam, 92.2% was delivered to completion.

This period included the first of week of 2-bunch user operations. There were no significant interruptions. Note: this is the first time ALS has run in 2-bunch-mode at full energy injection (1.9 GeV).

Long-term and weekly operations schedules are available on the Web at <http://www-als.lbl.gov/als/schedules/index.html> . Requests for special operations use of the "scrubbing" shift should be sent to Rick Bloemhard (ALS-CR@lbl.gov, x4738) by 1:00 p.m. Friday. A Web page showing the ring status in real time can be found at <http://www-als.lbl.gov/als/status/> .

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ALSNews is a monthly electronic newsletter to keep users informed about developments at the Advanced Light Source, a national user facility located at Ernest Orlando Lawrence Berkeley National Laboratory, University of California. The current and past issues of ALSNews are available on the World Wide Web. Point your browser to the following URL:

http://www-als.lbl.gov/als/als_news/

To subscribe, unsubscribe, or change your delivery address for the email version of ALSNews, send a message indicating your wishes and including your name and email address to alsnews@lbl.gov. We welcome suggestions for topics and content.

LBNL/PUB-948 (2008)

Editors: jmccullough@lbl.gov, Istamura@lbl.gov, ejmoxon@lbl.gov

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Current issue online at http://www-als.lbl.gov/als/als_news/

1. ELECTRONIC STRUCTURE OF COBALT NANOCRYSTALS SUSPENDED IN LIQUID
(Contact: Jinghua Guo, jguo@lbl.gov)

Advances in the synthesis of crystals of nanometer dimensions, narrow size distribution, and controlled shape have generated interest because of the potential to create novel materials with tailored physical and chemical properties. New properties arise from quantum confinement effects and from the increasing fraction of surface atoms with unique bonding and geometrical configurations. At the ALS, an international team of scientists has performed an electronic structure study of colloidal nanocrystals--nanocrystals suspended in the liquid solvent in which they were grown. A range of photon-in/photon-out spectroscopies, including x-ray absorption spectroscopy (XAS), was applied. These techniques are element-selective, as they involve core atomic levels and can thus probe the local electronic structure of selected species in complex systems.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/163colloid.html

Publication about this research: H. Liu, J. Guo, Y. Yin, A. Augustsson, C. Dong, J. Nordgren, C. Chang, P. Alivisatos, G. Thornton, D.F. Ogletree, F.G. Requejo, F. de Groot, and M. Salmeron, "Electronic structure of cobalt nanocrystals suspended in liquid," *Nano Lett.* 7, 1919 (2007).

2. THE IRON SPIN TRANSITION IN THE EARTH'S LOWER MANTLE

(Contact: Sergio Speziale, speziale@gfz-potsdam.de)

It is now known that the iron present in minerals of the lower mantle of the Earth undergoes a pressure-induced transition with pairing of the spins of its 3d electrons. A team from the University of California, Berkeley, Tel Aviv University, and Lawrence Livermore National Laboratory has used x-ray diffraction at very high pressure to investigate the effects of this transition on the elastic properties of magnesiowuestite ($\text{Mg}_{1-x}\text{Fe}_x\text{O}$), the second most abundant mineral in the Earth's lower mantle. The new results suggest that the effect of the spin-pairing transition on magnesiowuestite can be large enough to require a partial revision of the most accepted model of the lower mantle composition.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/166iron.html

Publications about this research: S. Speziale, V.E. Lee, S.M. Clark, J.F. Lin, M.P. Pasternak, and R. Jeanloz, "Effect of Fe spin transition on the elasticity of $(\text{MgFe})\text{O}$ magnesiowuestite for the seismological properties of the Earth's lower mantle," *J. Geophys. Res.* 112, B10212 (2007); S. Speziale, A. Milner, V.E. Lee, S.M. Clark, M.P. Pasternak, and R. Jeanloz, "Iron spin transition in Earth's mantle," *Proc. Nat. Acad. Sci. U.S.A.* 102, 17918 (2005).

3. STRUCTURE OF SYNAPTIC CONNECTORS SOLVED

(Contact: Axel T. Brunger, brunger@stanford.edu)

Establishment of neural connections at specialized intercellular junctions called synapses is critical for proper brain function, and errors in the process are thought to be associated with autism and other disorders. Researchers from Stanford University and the University of Texas Southwestern Medical Center have reported high-resolution, three-dimensional structures of the proteins, called neuroligin-1 and neurexin-1[β], that form this connection. Because mutations in the neurexin and neuroligin genes are among the multiple genetic causes of autism, understanding the molecular mechanism of these proteins in synapse development is a first step towards development of novel therapeutics directed to treat and possibly cure autism.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/165autism.html

Publication about this research: D. Arac, A.A. Boucard, E. Oezkan, P. Strop, E. Newell, T.C. Suedhof, and A.T. Brunger, "Structures of Neuroligin-1 and the Neuroligin-1/Neurexin-1[β] complex reveal specific protein-protein and protein- Ca^{2+} interactions," *Neuron* 56, 992 (2007).

4. STATUS OF THE USER SUPPORT BUILDING AND BERKELEY LAB GUEST HOUSE PROJECTS

(Contact: Steve Rossi, SLRossi@lbl.gov)

User Support Building

The project team has been working to minimize the impacts of the directed funding change for the project this fiscal year (\$5M instead of the planned \$17M). We are moving forward with a phased-construction model and plan to break ground this summer to install the foundations and underground utilities. Work on this phase should be completed around the end of the calendar year. The next phase will begin in spring/summer 2009 and will include the structural steel and exterior skins of the building. This phase will be completed around the end of calendar year 2009. The final project phase will begin in spring/summer 2010 and include the entire interior fit-up of the building. Depending on how early the funding for the 2010 fiscal year arrives, the project will be completed in either late 2010 or early 2011. We have scheduled a six-week shutdown this fall, beginning on September 2nd, to accommodate construction work that is not compatible with ALS user operations due to vibrations. This plan coincides well with other shutdown needs at this time. We are thrilled that we are moving forward on this critical facility, which will improve our support for our users.

Berkeley Lab Guest House

Design work on the 57-room Guest House has been moving rapidly. Trees were removed earlier this month, allowing construction to begin this week. We anticipate construction of the relatively simple wood-framed structure to be completed in April 2009 and the Guest House to be open for guests shortly thereafter. We are also looking for an operator for the Guest House. The selection of an operator will allow us to determine room rates and better define services. We hope to receive a proposal in the coming few weeks that will conclude this effort.

5. UEC CORNER: USERS' MEETING UPDATE

(Contact: Hendrik Ohldag, hohldag@stanford.edu)

The preparations for the 2008 ALS Users' Meeting (beginning October 13) are well underway. Apart from talks highlighting the outstanding science that has been performed by ALS users over the past year, the meeting program will feature presentations by Berkeley Lab Director Steve Chu addressing the future of the laboratory and the role of the ALS. ALS management will report on the current status of the ALS, and representatives from the Office of Basic Energy Sciences, Department of Energy (DOE), will provide insight into the current funding situation and its future. We will also hold a special session in memory of Daniel Chemla, former director of the Advanced Light Source, who recently passed away. During this session, Patricia Dehmer (Office of Science, DOE) and Charles Shank (University of California, Berkeley) will share their memories of Daniel with us, and Paul Alivisatos (Berkeley Lab Deputy Director) will give a special scientific talk. We hope you can all attend this very special session to remember Daniel.

In addition, the meeting will feature a Town Hall meeting, a poster session held in collaboration with the Molecular Foundry, and presentations by the winners of the Halbach, Shirley, and poster awards. The program committee is currently assembling a list of workshops that will take place on October 14 and continue on through the morning of the 15. Anyone who is interested in holding a workshop should immediately contact Phil Heimann (PAHeimann@lbl.gov) or Wayne Stolte (WCStolte@lbl.gov).

6. NEW PRESSURE RECORD SET AT THE ALS

(Contact: Simon Clark, SMClark@lbl.gov)

Beamline 12.2.2, the extreme conditions beamline, has a new record for the highest pressure. On Saturday, April 26, Kirill Zhuravlev from the Geological and Planetary Science department of the California Institute of Technology set the new beamline record of 1.12 million bar using a symmetric diamond anvil cell while measuring the equation of state of an iron-rich ferropericlasite sample. To give you an idea of how extreme this is, this pressure is equivalent to the pressure existing at the boundary of the Earth's mantle and core. This work is aimed at helping us understand the structure of the innermost Earth and will help improve our current models of planetary evolution.

7. BULLETIN BOARD

Memorial Service for Daniel Chemla

A memorial for Daniel Chemla will be held on Saturday, May 10, from 10 a.m. to 12 noon at UCB Pimentel Hall (<http://www.berkeley.edu/map/maps/BC56.html>), followed by a reception from 12 noon to 2 p.m. at the Men's Faculty Club (<http://www.berkeley.edu/map/maps/CD56.html>).

ALS Video Tour Makes It to YouTube

Among the highlights of a UC Berkeley class offered last spring, "Synchrotron Radiation for Materials Science Applications," was a tour of the ALS, which was videotaped and recently posted on YouTube (<http://www.youtube.com/watch?v=iEHWQv7b-Cw>). The class took students to the light source for a crash course on the early development of cyclotrons, the inner workings of the ALS, recent equipment updates, and its service as a national user facility. The tour overview was provided by ALS scientist Tony Warwick.

Updated Operating Schedule

The long-term operating schedule has been revised in order to increase the 2-bunch time in the next cycle (July-December 2008). In addition, the number of multibunch (MB) shifts has been revised to 275. To view the latest schedule, go to http://www-als.lbl.gov/als/schedules/next_itsch.html .

Save the Dates

June 2-3, SLAC AMO Proposal Workshop. For more information, go to <http://www-ssl.slac.stanford.edu/lcls/amo/> .

June 17-19, SLAC Ultrafast X-Ray Summer School 2008. For more information, go to <http://www-conf.slac.stanford.edu/uxss/2008/> .

August 17–22, Stanford–Berkeley Summer School on Synchrotron Radiation and Its Applications. For more information, go to <http://www-als.lbl.gov/als/news.html> .

8. ALS-RELATED WEB NEWS AND LINKS

Exotic Quantum State of Matter Discovered
<http://www.sciencedaily.com/releases/2008/04/080424130707.htm>

Interview with a Protein
<http://www.the-scientist.com/news/display/54542/>

Efforts to Increase Science Funding
<http://www.aip.org/fyi/2008/049.html>

9. OPERATIONS UPDATE

(Contact: Dave Richardson, DBRichardson@lbl.gov)

For the user runs from March 18 to April 29 the beam reliability (time delivered/time scheduled) was: 91.9%. Of the scheduled beam, 87.8% was delivered to completion. This period included the second week of 2-bunch user operations. Failure of a cable in the storage ring series QFA power supply on March 25 resulted in the loss of over 9 hours of scheduled beam time.

Long-term and weekly operations schedules are available on the Web at <http://www-als.lbl.gov/als/schedules/index.html> . Requests for special operations use of the "scrubbing" shift should be sent to Rick Bloemhard (ALS-CR@lbl.gov, x4738) by 1:00 p.m. Friday. A Web page showing the ring status in real time can be found at <http://www-als.lbl.gov/als/status/> .

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http://www-als.lbl.gov/als/als_news/

To subscribe, unsubscribe, or change your delivery address for the email version of ALSNews, send a message indicating your wishes and including your name and email address to alsnews@lbl.gov. We welcome suggestions for topics and content.

LBNL/PUB-948 (2008)

Editors: jmccullough@lbl.gov, lstamura@lbl.gov, ejmoxon@lbl.gov

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Current issue online at http://www-als.lbl.gov/als/als_news/

1. DIRECTOR'S UPDATE: THE ALS MOVES FORWARD
(Contact: Roger Falcone, RWFalcone@lbl.gov)

We begin the summer at the ALS having recently closed a period of reduction in force (RIF), but looking forward, with proposals to develop new resources and fund new instruments. I want to thank everyone for their cooperation during the RIF, and recognize that, although it was painful, we have met our goals; the ALS is now better able to deal with the continued uncertainty in federal budgets.

We are in the process of submitting a variety of funding requests to DOE, ranging from a theory program, to detector development, to research on energy problems, to the rebuilding of Sector 7, and more, all in anticipation of new programs that Congress and the President seem poised to support in the next fiscal year. For example, a recent DOE call for proposals spans a wide range of activities, extending from single-investigator and small-group research (SISGR), to Energy Frontier Research Centers (EFRCs). Funding for new awards under these programs should be available in FY 2009, pending appropriations. The research and instrumentation areas covered include those outlined in the Grand Science Challenges Report of the Basic Energy Sciences Advisory Committee (<http://www.sc.doe.gov/bes/reports/list.html>), and Use-Inspired Discovery Science, as described in The 10 Basic Research Needs Workshop Reports (<http://www.sc.doe.gov/bes/reports/list.html>).

It is important to note that although growth at the ALS and other national facilities has been limited under recent federal budgetary restraints, new opportunities for funding continue to arise.

I strongly encourage our users and staff to bring forward new ideas to take advantage of such opportunities. We can provide important assistance in bringing such proposals to funding agencies, foundations, etc. Partnerships among users and the ALS can be very persuasive.

Finally, Ben Feinberg, ALS Deputy Division Director, has decided to retire at the end of June. Ben has been with Berkeley Lab for over 30 years—he worked in magnetic fusion, was a leader at the Super HILAC and Bevalac, then joined the ALS in 1993. Ben says "it's time," but fortunately, he will still be around to advise us as he continues research as an emeritus scientist but finds some time for other activities. As a new director, I learned much from him about the ALS, its people, the Lab, DOE, etc. He continues to be part of the heart and soul of the ALS, and I will miss his wisdom and our partnership.

To read the Director's Update in its entirety, go to http://www-als.lbl.gov/alsdev/als_news/news_archive/vol.287_052808.html#1 .

2. SOLVING THE UNSOLVABLE: THE NANOSTRUCTURE OF GOLD AT 1.1 ANGSTROM RESOLUTION

(Contact: Roger Kornberg, kornberg@stanford.edu)

For the first time, a team of scientists led by Roger Kornberg has synthesized thiol-covered gold nanoparticles and, using ALS Beamlines 5.0.2 and 8.2.2 and SSRL Beamlines 11-3 and 11-1, conclusively ascertained their atomic structure (at 1.1 angstrom resolution). The gold-thiol nanoparticle consists of 102 gold atoms surrounded by 44 molecules of a thiol compound (paracaptobenzoic acid, or p-MBA). The central gold atoms are grouped in a fivefold symmetric packing arrangement known as a Marks decahedron, which is surrounded by additional layers of gold atoms in unanticipated geometries. The protective p-MBAs interact not only with the gold but with one another, forming a rigid surface layer. This research is a success on several levels. The group developed a technique that solves a previously unsolvable nanostructure. They delivered a very detailed atomic map of this structure, which itself reveals an unusual discovery: the discrete nature of the nanoparticle, which can be explained by the closing of a 58-electron shell.

Read the full story at
http://www-als.lbl.gov/als/science/sci_archive/164gold.html

Publication about this research: P.D. Jadzinsky, G. Calero, C.J. Ackerson, D.A. Bushnell, and R.D. Kornberg, "Structure of a thiol monolayer-protected gold nanoparticle at 1.1 angstrom resolution," *Science* 318, 430 (2007).

3. A KEY ENZYME TO THE POTENCY OF AN ANTICANCER AGENT

(Contact: Bradley Moore, bsmoore@ucsd.edu)

Incorporation of halogen atoms into drug molecules often increases biological activity. This is the case with salinosporamide A (sal A), a natural product from the marine bacterium *Salinispora*

tropica that is 500 times more active than sal B, its nonchlorinated analog. Sal A is in phase I human clinical trials for the treatment of multiple myeloma and solid tumors. A group of researchers, using diffraction data collected at ALS Beamline 8.2.2, discovered and characterized the chlorinating SalL enzyme, a crucial component in sal A biosynthesis that uses a unique chlorine-activating mechanism.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/168SalL.html

Publication about this research: A.S. Eustaquio, F. Pojer, J.P. Noel, and B.S. Moore, "Discovery and characterization of a marine bacterial SAM-dependent chlorinase," *Nature Chemical Biology* 4, 69 (2007).

4. ALS DETECTOR DEVELOPMENT UPDATE

(Contact: Peter Denes, PDenes@lbl.gov)

Detector development for the ALS is slowly taking off, with current efforts focused on finalizing and deploying fast CCD cameras. The fast CCDs and their corresponding custom readout chips were developed under Laboratory-Directed Research and Development (LDRD), and the camera is being assembled as a collaboration between the ALS and Argonne's Advanced Photon Source (APS), with the ALS providing the CCDs, readout chips, and mechanics, and APS providing the clocking and digital readout.

The prototype CCD has 480 x 480 x 30 micron pixels and 96 output ports. It has been used in the lab as well as on ALS Beamline 5.3.1 to characterize the CCDs. First tests clocking the CCD at several hundred frames per second (compared to the present rate of several seconds per frame) were performed in February 2008, when the Argonne clocking system was mated to the Berkeley CCD.

The full Argonne readout will be connected to the fast CCD during the first week of June. After that, the complete assembly will be checked on Beamline 5.3.1 and will then be ready for use. At next month's ESG/SSG seminar (June 10 at 9 a.m.), Peter Denes will update the status of the detector activities and describe the proposal submitted to DOE based on the workshop at the last Users' Meeting. There will be ample time for discussion, as this should be less of a seminar and more of a follow-up to what was discussed at the Users' Meeting.

5. DANIEL CHEMLA REMEMBERED

On Saturday, May 10, friends and colleagues gathered at the University of California, Berkeley, to remember former ALS Division Director Daniel Chemla. Invited speakers included Berkeley Lab Director Steven Chu, former director Charles Shank, leaders of the American and French Shotokan Karate Federations, and family members. Speakers described his youth in Tunisia, his studies in France, his unmatched prowess in karate, his brilliant scientific career at Bell Labs and Berkeley Lab, and his love of family. Through all these stories, Daniel was repeatedly

remembered for his intensity, his passion, and the excellence he achieved in anything he did. The well-attended and often gently humorous memorial was followed by a reception at the Men's Faculty Club where Daniel's family, friends, and fellow scientists and karate experts from around the world enjoyed more stories of his exploits. For more information about Daniel, go to <http://www-als.lbl.gov/als/news/chemla.html> .

6. BIW08 BRINGS BEAM DIAGNOSTICS AND INSTRUMENTATION COMMUNITY TOGETHER

(Contact: Fernando Sannibale, FSannibale@lbl.gov)

The 13th biennial meeting of the Beam Instrumentation Workshop (BIW) took place at Lake Tahoe on May 4–8. It was sponsored by Berkeley Lab's Accelerator and Fusion Research, Engineering, and ALS divisions. This international conference on beam diagnostics and instrumentation for accelerators is probably the most important gathering in the field of beam instrumentation, together with its European counterpart, the Diagnostics for Particle Accelerators Conference (DIPAC), which alternates with BIW on alternate years. The conference offers formal presentations, a poster session, and informal discussions to promote the exchange of ideas and issues between scientists, engineers, and representatives of companies operating in the field. Approximately 120 people attended, tutorial sessions served as introduction to relevant topics, and a vendor exhibition allowed participants to get updated information on related commercial products.

The Faraday Cup Award, which recognizes and encourages innovative achievements in the field of particle accelerator beam instrumentation, was presented during the workshop. The award consists of a money prize and a certificate, and the BIW program committee is solely responsible for the selection of the recipient (<http://www.faraday-cup.com/>). This year's winner is Suren G. Arutunian, of the Yerevan Physics Institute, Yerevan, Armenia, for the development, publication, and successful testing of the diagnostic system, "Vibrating Wire Scanner."

Fernando Sannibale of the ALS Accelerator Physics Group was the BIW08 chair this year, and the local organizing committee was coordinated by Joy Kono of the ALS. Berkeley Lab's contribution included three invited talks, one contributed talk, and two posters. Information on BIW08 as well as PDFs of presentations can be found on the conference Web site at <http://www-als.lbl.gov/biw08/> . Conference proceedings will be published on the Joint Accelerator Conferences Web site (JACoW) (<http://accelconf.web.cern.ch/AccelConf/>) at the end of this summer.

7. REPORT ON NUFO ANNUAL MEETING: APRIL 24-25 2008

(Contact: Susan Bailey, SBailey2@lbl.gov)

NUFO, the National User Facilities Organization (<http://www.bnl.gov/nufo/>), provides a unified voice for a diverse group of nationally funded user facilities across the United States, including light sources, neutron sources, nanoscale centers, etc. This year representatives from 20 North American user facilities met at the Pacific Northwest National Laboratory's Environmental

Molecular Sciences Laboratory (EMSL) in Richland, WA, to discuss security and outreach and to compare and share our experiences with supporting users. Representatives include user services administrators and the Users' Executive Committee (UEC) chairs from national user facilities.

After introductions, the speakers were led by Pedro Montano (DOE) with a wide-ranging presentation on "Future Challenges for National User Facilities." Jack Bagley (Battelle Memorial Institute) gave an update on science funding, and several speakers described their outreach experience. Linda Horton (Oak Ridge National Laboratory) talked about establishment of the nanoscale research science centers, and David Koppenaal (EMSL) discussed a case study of how to integrate research teams. During several talks there was discussion of potential ways to streamline the proposal process for users applying to multiple facilities, and to what extent similar facilities could learn from each other and coordinate their processes to simplify the interface to users. EMSL, which provides integrated experimental and computational resources for the environmental molecular sciences, held tours of the laboratory that exhibited the breadth of the science done there. The diversity of the facilities made available to users include spectrometers (900 MHz NMR, mass spectroscopy, EPR, photoelectron), microscopes (EM, Raman, scanning probe, PEEM, fluorescence), and high-performance supercomputing.

A key component of the conference was the establishment of a charter for NUFO, a draft of which can be found on the NUFO Web site, along with presentations from the workshop. The Web site also gives access to contact details for the user administrators and user organization representatives from all the national user facilities.

8. CALL FOR RECENT PUBLICATIONS

(Contact: Ken Winters, kwinters@lbl.gov, 510-486-6875)

Please update the ALS publications database with your recent publications (2007-2008). These are our metric for demonstrating the productivity of the ALS and of individual beamlines. Details of publications are reported annually to the DOE, and triennially when we are reviewed. We are interested in all journal articles, conference proceedings, books, and theses, as well as patents based on work done at the ALS. Since duplicates can be difficult to track down, please always check that the publication is not already present in our database. Simply go to the User Services Publications Web page and follow this two-step process:

(1) First, "Search for Publications" to see if your publication already has been entered by a collaborator. If it has, you're done. If not,

(2) Use the "Submit Publication Listings" option and enter the information requested. The most important fields are "Title" and "Journal or Publication Name." If you don't have other information, such as the specific page or month published, please type "n/a" in the field; we will attempt to track it down.

9. BULLETIN BOARD

ALS Apartments Closing

After consulting with the UEC and ALS senior management, we have decided to close the accommodations provided by the ALS apartments earlier than was previously envisaged and before the Berkeley Lab Guest House is ready to accept guests. The decision is a cost-saving measure and is effective August 9, when the current lease on the apartments expires. The User Services Office (<http://www-als.lbl.gov/als/quickguide/useroffice.html>) will provide support for users by making available information on alternative accommodations available in the Berkeley area.

ALS Shutdown Status

Another busy shutdown is underway at the ALS. The second of four phases of a seismic retrofit of the ALS dome is being done as well as a variety of technical projects. These include the annual replacement of the superbend magnet cold heads, installation of apertures in beamline front ends to ready for top-off mode injection, interlock installations and testing for top off, as well as many smaller beamline projects. User operations will resume on June 12.

10. ALS-RELATED WEB NEWS AND LINKS

To Be or Not To Be Localized

<http://www.sciencemag.org/cgi/content/summary/sci;320/5878/884>

New Clues to How Proteins Dissolve and Crystallize

<http://www.lightsources.org/cms/?pid=1002768>

Can One 'Pin Down' Electrons?

<http://www.lightsources.org/cms/?pid=1002775>

11. OPERATIONS UPDATE

(Contact: Dave Richardson, DBRichardson@lbl.gov)

For the user runs from April 22 to May 11, the beam reliability (time delivered/time scheduled) was: 97.9%. Of the scheduled beam, 94.9% was delivered to completion. There were no significant interruptions. Questions about beam reliability should be sent to Dave Richardson. Requests for special operations use of the "scrubbing" shift should be sent to Rick Bloemhard (ALS-CR@lbl.gov, x4738) by 1:00 p.m. Friday.

Long-term and weekly operations schedules are available on the Web At <http://www-als.lbl.gov/als/schedules/index.html>. Requests for Special operations use of the "scrubbing" shift should be sent to Rick Bloemhard (ALS-CR@lbl.gov, x4738) by 1:00 p.m. Friday. A Web page showing the ring status in real time can be found at <http://www-als.lbl.gov/als/status/>.

ALSNews is a monthly electronic newsletter to keep users informed about developments at the Advanced Light Source, a national user facility located at Ernest Orlando Lawrence Berkeley National Laboratory, University of California. The current and past issues of ALSNews are available on the World Wide Web. Point your browser to the following URL:

http://www-als.lbl.gov/als/als_news/

To subscribe, unsubscribe, or change your delivery address for the email version of ALSNews, send a message indicating your wishes and including your name and email address to alsnews@lbl.gov. We welcome suggestions for topics and content.

LBNL/PUB-948 (2008)

Editors: jmccullough@lbl.gov, lstamura@lbl.gov, ejmoxon@lbl.gov

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Current issue online at http://www-als.lbl.gov/als/als_news/

1. DIRECTOR'S UPDATE: High Praise for the ALS in BES Triennial Review Report
(Contact: Roger Falcone, RWFalcone@lbl.gov)

Pedro Montano has sent me a summary of the report from the triennial DOE BES review of the ALS that was held last March, and I am extremely proud of the results. To quote the opening paragraph, "The ALS scientific output continues to excel with an exceptional percentage of publications in the 'high impact' category. This reflects positively on its world-class beamline capabilities and outstanding scientific staff." This is high praise, indeed, only made possible by the contributions of all members of the ALS staff and users working together.

I would like to share with you some of the observations. Reviewers noted that the ALS has made significant improvements for the user community, including a web-based proposal system described as being transparent and fair. They also commended ALS Safety Program Manager Jim Floyd's collaborative style of working with users to implement pragmatic safety measures.

There was praise for the progress made toward top-off operation, as well as for several instrument achievements, including the new EPU Beamline 11.0.1 and the steps taken toward the PEEM3 microscope; superbend Beamline 12.3.2, which extended the energy range for white-beam x-ray Laue microdiffraction and provided enhanced strain sensitivity; the progress on Beamline 4.0.3 (MERLIN), including an aperiodic undulator for harmonic rejection; and the move of the ultrafast program to Sector 6.0, which resulted in much improved intensity on the high- and low-energy branch lines.

Finally, reviewers were impressed by the strong interactions between the ALS and both the Scientific Advisory Committee (SAC) and the Users' Executive Committee (UEC). They also commented favorably on the ALS Strategic Plan and pointed out that the ALS has taken the lead in establishing a graduate student and post-doc support program, vital to developing a pipeline for future beamline and accelerator scientists.

Other than our well-known staffing shortages, no major shortcomings were identified in the review. Dr. Montano's letter accompanying the report summary concludes by "commending the ALS on continuing its outstanding scientific output and instrument development," a view I heartily share.

This was a gratifying review, a testament to our collective efforts at the ALS. I thank everyone for a job well done.

2. SLOW DYNAMICS OF ORBITAL DOMAINS IN A MANGANITE (Contact: Joshua Turner, JJTurner@lbl.gov)

At the ALS, an international team of researchers has used low-energy coherent x rays to extract new knowledge about the correlated motion of groups of self-assembled, outer-lying electrons in the extremely complex electronic system found in manganites. The manganite family of materials has puzzled physicists for years by defying standard models for the motion of electrons in crystals. By controlling the properties of the incident x rays, the researchers were able to map the complexity of a "half-doped" manganite into a far-field speckle diffraction pattern to study the manganite's domain dynamics. Their results suggest the material undergoes a transition characterized by the competition between a pinned orbital domain topology that remains static and mobile domain boundaries that exhibit slow, temporal fluctuations.

Read the full story at
http://www-als.lbl.gov/als/science/sci_archive/167speckle.html

Publication about this research: J.J. Turner, K.J. Thomas, J.P. Hill, M.A. Pfeifer, K. Chesnel, Y. Tomioka, Y. Tokura, and S.D. Kevan, "Orbital domain dynamics in a doped manganite," *New J. Phys.* 10, 053023 (2008).

3. LOOKING AT TRANSISTOR GATE OXIDE FORMATION IN REAL TIME (Contact: Yoshiharu Enta, enta@cc.hirosaki-u.ac.jp)

The oxide gate layer is critical to every transistor, and present-day layer thicknesses are in the 10-20 angstrom range (1-2 nm). However, little information exists on the oxidation process at this thickness. Available results are either for thicker layers grown under high-pressure conditions or for only the first couple of monolayers studied under high-vacuum conditions. Now, for the first time, a group of researchers has obtained real-time oxidation results for this elusive range. Using the ambient-pressure x-ray photoelectron spectroscopy (APXPS) endstation at ALS Beamline 9.3.2, they examined oxidation of Si(100) at pressures up to 1 torr and

temperatures up to 450 degrees C. The Si 2p chemical shifts allowed determination of oxide thickness as a function of time with a precision of 1-2 angstroms. The initial oxidation rate was very high (up to approx. 234 Å/h). Then, after an initial oxide thickness of 6-22 angstroms was formed, the rate decreased markedly (approx. 1.5-4.0 Å/h). Neither rate regime can be explained by the standard Deal-Grove (D-G) model for Si oxidation. These results are a significant step toward developing a better understanding of this critical thickness regime.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/170gateoxide.html

Publications about this research: Y. Enta, B.S. Mun, M. Rossi, P.N. Ross, Jr., Z. Hussain, C.S. Fadley, K.-S. Lee, and S.-K. Kim, "Real-time observation of the dry oxidation of the Si(100) surface with ambient pressure x-ray photoelectron spectroscopy," *Appl. Phys. Lett.* 92, 012110 (2008); M. Rossi, B.S. Mun, Y. Enta, C.S. Fadley, K.S. Lee, S.-K. Kim, H.-J. Shin, Z. Hussain, and P.N. Ross, Jr., "In situ observation of wet oxidation kinetics on Si(100) via ambient pressure x-ray photoemission spectroscopy," *J. Appl. Phys.* 103, 044104 (2008).

4. FACILITIES FEATURE: A SWISS ARMY KNIFE WITH A 4-MICRON BLADE

(Contact: Matthew Marcus, MAMarcus@lbl.gov)

This is how beamline scientist Matthew Marcus thinks of ALS Beamline 10.3.2, a hard x-ray microprobe with an energy range from 2.5 keV (sulfur K-edge) to 17 keV, producing a monochromatic beam focused to a spot size on the sample of 4 to 16 microns. It's an apt metaphor for this versatile beamline as it combines three techniques that can be used in succession on the same sample. Experimental techniques include micro x-ray fluorescence (micro-XRF), which probes chemical composition; x-ray absorption spectroscopy (micro-XAS), which probes chemical state and environment of a specific element; and x-ray diffraction (micro-XRD), which examines crystal structure of major phases at a point.

Many research teams have been benefiting from 10.3.2's versatility. Exciting findings in the areas of environmental remediation and solar cell engineering have emanated from two groups in particular. Manceau et al. have discovered a new form of copper in the rhizosphere. The team imaged the distribution of copper at the soil-root interface by micro-XRF and identified the new copper species as metallic nanoparticles by micro extended x-ray absorption fine-structure (micro-EXAFS) spectroscopy and micro-XRD. Promoting the formation of copper metal in the rhizosphere could be a highly efficient method of remediating copper contamination. A recent highlight on this research is available at http://www-als.lbl.gov/als/science/sci_archive/162copper.html .

Buonassisi et al. have been investigating the distribution of impurities in silicon solar cell material. The researchers use a combination of micro-XRF and micro-XAS techniques to study the distribution, chemical state, and electron-hole recombination activity of metal clusters in multicrystalline silicon. This research will provide valuable information on how to manipulate impurities and reduce their detrimental impact on efficiency, and is a promising path to cheaper

solar energy. A highlight on this research is available at http://www-als.lbl.gov/als/science/sci_archive/112solarcells.html .

Upgrades planned for the beamline include replacement of Kirkpatrick-Baez (KB) mirrors and benders to attain submicron spot size; installation of "QuickXAS," allowing acquisition of XAS spectra in under a minute; installation of a low-energy-capable monochromator to increase energy range and get to Al and, perhaps, Mg K-edges; and full spectrum/pixel micro-XRF mapping.

5. UEC CORNER

(Contact: Hendrik Ohldag, hohldag@stanford.edu)

Users' Meeting Approaches

The 2008 Users' Meeting is fast approaching (October 13-15). The poster session will again be held in conjunction with the Molecular Foundry. Another important item on the program agenda are the awards that are given out annually by the ALS Users' Executive Committee. You will have the opportunity to nominate a person or a group for the David A. Shirley Award for Outstanding Scientific Achievement at the ALS, the Klaus Halbach Award for Innovative Instrumentation at the ALS, and the Tim Renner User Services Award for Outstanding Support to the ALS User Community. The deadline for nominations will be set well before the start of the meeting to give the committee the opportunity to carefully deliberate and ask for advice from external experts if needed. In addition to the nominations submitted for the Shirley Award, we will also review the ALS publication database for high-impact publications that resulted from research performed at the ALS over the past two years. (For information on Users Meeting logistics, see "ALS Users' Meeting: Call for Abstracts and Meeting Information," below.)

Contact Your Local Representative

I would also like to encourage all of you to "get involved." The current funding situation at the national laboratories, which includes the ALS, is extremely poor. We already have to cope with reductions in staff and operating time, which affect our research programs. It is important and necessary that we make our concerns heard in Washington. Please contact your local representatives and let them know how the budget situation affects your research and the education of your students. Information and help regarding this issue can be found at <http://www.aps.org/policy/tools/index.cfm> and <http://www.alsuec.org/take-action.html>. You may also contact the UEC representatives at any time with questions and concerns. Our emails can be found at <http://www.alsuec.org/>.

6. 2008 ALS USERS' MEETING: CALL FOR ABSTRACTS AND MEETING INFORMATION

(Contact: alsum@lbl.gov)

General information, meeting deadlines, and online registration for this year's ALS Users' Meeting, to be held at Berkeley Lab on October 13-15, 2008, will be posted shortly on the Users' Meeting Web site at <http://www-als.lbl.gov/als/usermtg/>. The early registration deadline is Friday, September 19. Go to <http://www-als.lbl.gov/als/usermtg/lodging.html> for local hotel accommodation information for meeting participants.

Abstracts Submission

The deadline for abstract submissions for oral presentations during the ALS Scientific Highlights session is Friday, August 15. Submissions for the oral presentations and poster sessions, including the student poster competition, can be entered online at <http://www-als.lbl.gov/als/usermtg/abstracts.html>.

Workshops

This year, ten workshops will follow the end of the formal Users' Meeting program beginning Tuesday morning (October 14) and continuing through the morning of Wednesday, October 15. Organizer contact information and several workshop topics are available on the Users' Meeting Workshops Web page at <http://www-als.lbl.gov/als/usermtg/workshops.html>.

7. GENERAL USER PROPOSAL UPDATES

(Contact: [Contact: alsproposals@lbl.gov](mailto:alsproposals@lbl.gov))

General User Proposal Scores Posted Online

The general user beam time allocation process for the running period from July through December 2008 is complete for the general sciences. The number of eight-hour shifts requested was 7152, of which 3583 shifts (50%) were allocated to general users. For more detailed results, including beamline score distributions and cutoff scores, go to General User Proposal Scores: General Sciences at <http://www-als.lbl.gov/als/quickguide/pspscores.html> . Beam-time requests for general user experiments are reviewed twice each year. All proposals first undergo peer review, after which a Proposal Study Panel (PSP) also evaluates each proposal. This process is the basis for granting beam time. The PSP is made up of ten scientists from a variety of synchrotron scientific disciplines. There is a separate PSP that reviews the crystallography proposals six times each year. More information on the PSP and the general user proposal review process is available on the General User Proposals Web page at <http://www-als.lbl.gov/als/quickguide/independinvest.html> .

July 15 Deadline for General User Proposal Submissions

The User Services Office is accepting general user proposals from scientists who wish to conduct research in the general sciences at the ALS during the running period from January through June 2009. The deadline is July 15, 2008. (This deadline does not apply to protein crystallography proposals, which have a separate process and schedule.) To submit a new proposal, fill out the ALS General User Proposal and Request for Beam Time form at http://alsusweb.lbl.gov/4DCGI/WEB_GetForm/Page1P.shtml/Initialize . For further information on proposals, go to the General User Proposals Web page.

8. BULLETIN BOARD

Guest House Construction Site and Altered Pedestrian Routes

Construction is now underway at the Guest House site. For your safety, it is requested that you follow new pedestrian routes. For those going down the stairs next to Building 2 from Buildings 6, 80, etc., please turn left on the new pedestrian path to access the cafeteria. For those exiting Building 2 on the ground floor, you will notice that you are now directed to the right. Please observe this direction and use the new crosswalk, and walk inside the new handrails. Trucks and equipment will be entering and exiting from both ends of the construction site. Please exercise extra caution when walking near the site.

Another Safe and Successful Shutdown Completed

Another safe and successful shutdown has been completed at the ALS. The second of four phases of a seismic retrofit of the ALS dome was done as well as a variety of technical projects. These included the annual replacement of the superbend magnet cold heads, installation of apertures in beamline front ends to ready for top-off mode injection, interlock installations and testing for top off, as well as many smaller beamline projects. User operations resumed on June 12.

ALS Infrared Beamlines Unveils New Web Page

This useful and all-purpose web site has tools for current users, publications lists, news and information links, and more. To view, go to <http://infrared.als.lbl.gov>

9. ALS-RELATED WEB NEWS AND LINKS

Surprising graphene

<http://www.lightsources.org/cms/?pid=1002801>

Fruit fly protein acts as decoy to capture tumor growth factors, find Penn researchers

<http://www.lightsources.org/cms/?pid=1002791>

UBC physicists develop 'impossible' technique to study and develop superconductors
http://7thspace.com/headlines/285224/ubc_physicists_develop_impossible_technique_to_study_and_develop_superconductors.html

University of Pennsylvania engineers reveal what makes diamonds slippery at the nanoscale
http://7thspace.com/headlines/285223/university_of_pennsylvania_engineers_reveal_what_makes_diamonds_slippery_at_the_nanoscale.html

Scripps Research crystal structure reveals mystery behind three rare childhood disorders
<http://www.genomicsproteomics.com/index.aspx?ID=92349>

The structure of XPD sheds light on cancer and aging
<http://www.lightsources.org/cms/?pid=1002793>

11. OPERATIONS UPDATE

(Contact: Dave Richardson, DBRichardson@lbl.gov)

For the user runs from May 12 to June 16, the beam reliability (time delivered/time scheduled) was: 94.0%. Of the scheduled beam, 85.8% was delivered to completion. There were no significant interruptions. This period includes the scheduled shutdown for maintenance, installation, and upgrade, which began on May 12 and went through June 11; only the user run from June 12-16 is reflected in the data above. There were no significant interruptions.

Questions about beam reliability should be sent to Dave Richardson. Requests for special operations use of the "scrubbing" shift should be sent to Rick Bloemhard (ALS-CR@lbl.gov, x4738) by 1:00 p.m. Friday.

Long-term and weekly operations schedules are available on the Web At <http://www-als.lbl.gov/als/schedules/index.html> . Requests for Special operations use of the "scrubbing" shift should be sent to Rick Bloemhard (ALS-CR@lbl.gov, x4738) by 1:00 p.m. Friday. A Web page showing the ring status in real time can be found at <http://www-als.lbl.gov/als/status/> .

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ALSNews is a monthly electronic newsletter to keep users informed about developments at the Advanced Light Source, a national user facility located at Ernest Orlando Lawrence Berkeley National Laboratory, University of California. The current and past issues of ALSNews are available on the World Wide Web. Point your browser to the following URL:

http://www-als.lbl.gov/als/als_news/

To subscribe, unsubscribe, or change your delivery address for the email version of ALSNews, send a message indicating your wishes and including your name and email address to alsnews@lbl.gov. We welcome suggestions for topics and content.

LBNL/PUB-948 (2008)

Editors: jmccullough@lbl.gov, lstamura@lbl.gov, ejmoxon@lbl.gov

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Current issue online at http://www-als.lbl.gov/als/als_news/

1. POLARON COHERENCE CONDENSATION IN LAYERED COLOSSAL RESISTIVE MANGANITES

(Contact: Norman Mannella, nmannell@utk.edu)

Novel quantum phenomena, such as high-temperature superconductivity (HTSC) and colossal magnetoresistance (CMR), arise in certain materials where the interactions between electrons are very strong, but the mechanism driving their appearance remains a major puzzle. Now, angle-resolved photoemission findings from an international team led by researchers from Stanford University and the ALS provide the first direct spectroscopic evidence that the transition from insulator to metal in CMR manganese oxides (manganites) results from coherent "polaron condensation." The new findings also suggest that coherence-driven transitions are a generic controlling factor for novel quantum phenomena in doped transition-metal oxides.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/169manganites.html

Publication about this research: N. Mannella, W.L. Yang, K. Tanaka, X.J. Zhou, H. Zheng, J.F. Mitchell, J. Zaanen, T.P. Devereaux, N. Nagaosa, Z. Hussain, and Z.-X. Shen, "Nodal quasiparticle and polaron coherence condensation in layered colossal resistive manganites," *Phys. Rev. B* 76, 233102 (2007).

2. ELECTRIC-FIELD CONTROL OF LOCAL FERROMAGNETISM WITH A MAGNETOELECTRIC MULTIFERROIC

(Contact: L.W. Martin, LWMartin@lbl.gov)

Magnetoelectric multiferroics--materials that simultaneously show some form of magnetic and ferroelectric order--have excited condensed-matter researchers worldwide with the promise of coupling between magnetic and electric order parameters. A Berkeley-Stanford-Swiss group has now used the multiferroic bismuth-iron-oxygen compound BiFeO₃ (BFO) to explore electrical control of magnetism through exchange coupling with a ferromagnet. Their experiments reveal the possibility of controlling ferromagnetism with an electric field at room temperature, a capability that could result in new and novel devices for magnetic data storage, spintronics, and high-frequency magnetic devices.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/171magnetism.html

Publication about this research: Y.-H. Chu, L.W. Martin, M.B. Holcomb, M. Gajek, S.-J. Han, Q. He, N. Balke, C.-H. Yang, D. Lee, W. Hu, Q. Zhan, P.-L. Yang, A. Fraile-Rodriguez, A. Scholl, S.X. Wang, and R. Ramesh, "Electric-field control of local ferromagnetism using a magnetoelectric multiferroic," *Nature Mater.* 7, 478 (2008).

3. THE COMPLETION OF XM-2 HERALDS A NEW ERA IN BIOLOGICAL IMAGING AT THE ALS

by Gerry McDermott, GMcDermott@lbl.gov

Noted American physicist Richard Feynman once said "make the microscope one hundred times more powerful, and many problems in biology would be made very much easier." Four years ago, Carolyn Larabell, Mark Le Gros, and the staff of the National Center for X-Ray Tomography (at ALS Beamline 2.1) took Feynman's words to heart and began the construction of XM-2, a new transmission soft x-ray microscope. This was the first such imaging facility in the world to be designed specifically for biological imaging. Fast forward to the present and the original vision has been realized. XM-2 is now fully commissioned and producing an unprecedented number of high-resolution three-dimensional tomograms of cells in their native state. Each imaging experiment only takes three minutes or less. The large field of view on XM-2 equates to relatively large numbers of cells being imaged in each experiment. For bacteria and yeast, this can vary from a handful to upwards of 40 tomograms being produced per experiment. Consequently, XM-2 has been prodigiously productive in the short period since it was commissioned. With existing techniques, such as electron microscopy, obtaining data to reconstruct a tomogram of even a single yeast cell is considered a Herculean achievement. With XM-2 this has become a relatively trivial task.

All of this beautiful work is now showing up in the literature, the most recent of which was the cover article of the *Journal of Structural Biology* (Parkinson et al., *J. Struc. Biol.* 162, 380 [2008]). This paper describes the unique characteristics of soft x-ray microscopy as a biological imaging tool. For the first time, the organelles inside a cell can be imaged quantitatively. This is

essential for understanding the mechanisms that take place in normal cells and how this changes as a result of disease. The next phase is the incorporation of other imaging tools into XM-2, the most notable of which is a high-aperture cryogenic light microscope (for which Larabell and Le Gros were recently awarded patent rights). This resultant multimodal imaging capability has created enormous excitement in the field. For the first time, it will be possible to image and identify fluorescently labeled molecules inside a cell and then overlay this information onto a full soft x-ray 3D reconstruction. This revolutionary instrument and the developed correlated imaging methods ensure the ALS will remain at the forefront of biological and biomedical science for the foreseeable future and be a vital new tool for addressing the missions of NIH and DOE. For more information on becoming an NCXT user, go to http://ncxt.lbl.gov/?q=for_users.

4. FRENCH STUDENTS SPEND SUMMER AT ALS BEAMLINES

The ALS hosts students from high school to graduate school and from all over the world. One of our most successful collaborations is the ALS/ENSICAEN internship program, organized by ALS scientist Fred Schlachter and ENSICAEN professor Gilles Ban. ENSICAEN, located in Caen, France, offers engineering degrees in electronics, computer science, and material science and chemistry. "So many students were interested in coming to Berkeley that I had to find other hosts," says Fred.

This summer, six students interned with scientists Wayne Stolte, Alex Aguilar, and Michael Martin. Maxime Taupin worked with Wayne Stolte (of the University of Nevada, Las Vegas) at Beamline 9.3.1. Maxime used LabView to computerize and automate a magnetic mass spectrometer. As a part of his project, he consulted with engineers Mike Bell and Brian Smith to further understand the programming and electronics required for his project. Xavier Joubert and Claire Morichau Beauchant worked with Mike Martin on Beamline 1.4.3. Xavier is with ENSICAEN, Claire is with a similar program at the Ecole Nationale Supérieure de Physique in Grenoble. Xavier worked on two projects to use piezo-driven mirrors to scan the IR beam across the sample for faster mapping capabilities and determined how to make use of an array detector with actuated mirrors to drive the beam to different pixels within the array. Claire worked on a novel method to collect spectral images more rapidly using image compression techniques.

Mathilde Blanc, Mathieu Augustin, and Vincent Schoepff worked with Alex Aguilar and Rene Bilodeau at Beamline 10.0.1. Mathilde created an IDL program incorporating data analysis routines previously written by Rene and which makes these tools more user friendly. Mathieu, using a flight electron/ion simulation program called SIMION, performed all simulations needed for a series of modifications to an existing velocity map imaging detector at Beamline 10. Vincent worked on a program that reads and facilitates analysis of undulator and grating calibration data from Beamline 10.0.1 and produces the look-up tables for beamline operation. All three students actively participated during a beamtime led by Alex, measuring photoelectron angular distributions for single and double ionization of He atoms at threshold energies.

The relationship between the scientists and the students is reciprocal. The interns get the hands-on training they need to further their scientific and engineering education and an understanding of the difference between a scientist, who spends more time gathering and analyzing data, and an

engineer, who mainly designs and puts the pieces together. In turn, the scientists are rewarded with a fresh point of view to old problems, which can stimulate new solutions.

5. ALS USERS' MEETING INFO UPDATE

(Contact: alsum@lbl.gov)

General information, meeting deadlines, and online registration for this year's ALS Users' Meeting, to be held at Berkeley Lab on October 13-15, 2008, are posted on the Users' Meeting Web site at <http://www-als.lbl.gov/als/usermtg/>.

Workshops

This year, ten workshops will follow the end of the formal Users' Meeting program, beginning Tuesday morning (October 14) and continuing through the morning of Wednesday, October 15. One will be held jointly with SSRL.

Current and Future Upgrades and New Techniques for Improving the Performance of the ALS. Christoph Steier (LBNL) and Greg Portmann (LBNL)

Advanced Imaging Techniques for Nanostructures. Alex Hexemer (LBNL) and Frank Ogletree (LBNL)

Celebrating the 10th Anniversary of the Ion-Photon Beamline: Past, Present, and Future of Photon-Ion Interaction Studies. Alex Aguilar (LBNL), Rene Bilodeau (LBNL/Western Michigan University), and Ron Phaneuf (University of Nevada, Reno)

Energy and Environmental Science with Synchrotron Radiation. Musahid Ahmed (LBNL) and Kevin Wilson (LBNL)

Hard X-Ray Photoemission: Recent Progress and Promise for the Future. Chuck Fadley (LBNL) and Alexei Fedorov (LBNL)

Coherent X-Ray Scattering and Microscopy. Stefano Marchesini (LBNL), Tony Warwick (LBNL), David Shapiro (LBNL), and Sujoy Roy (LBNL)

Recent Advances in the Automation of Protein Crystallography. Peter Zwart (LBNL), Nick Sauter (LBNL), John Taylor (LBNL), and Paul Adams (LBNL)

Theory Institute for Photon Sciences.

Arun Bansil (LBNL), Tom Devereaux (SLAC), Dung-Hai Lee (UC Berkeley), and ZHussain@lbl.gov (LBNL)

X-Ray Imaging Technologies for Energy Storage. Alastair MacDowell (LBNL) Venkat Srinivasan (LBNL), and Vincent Battaglia (LBNL)

(Joint ALS/SSRL Workshop at SSRL) Soft X-Ray Beam Line for Material and Energy Science at LCLS. Denis Nordlund (SSRL), Andreas Scherz (SLAC), and Phil Heimann (LBNL)

Workshop agendas will be posted as soon as speakers are confirmed. Information on how to register and how to contact workshop organizers is available on the Users' Meeting Workshops Web page at <http://www-als.lbl.gov/als/usermtg/workshops.html> .

Important Deadlines

Abstract submissions for consideration for oral presentation: Friday, August 15

Award nominations: Friday, September 19

Registration: Friday, September 19 (go to <http://www-als.lbl.gov/als/usermtg/lodging.html> for local hotel information)

Award Nominations

ALS users and staff are also asked to take a minute and nominate an ALS staff member or user whose extra effort deserves recognition with an ALS scientific or user support award (<http://www-als.lbl.gov/als/usermtg/awards.html>). The deadline for nominations is Friday, September 19.

6. BULLETIN BOARD

ALS Doctoral Fellowship Application Deadline Extended to 7/31/08

These fellowships allow students who have passed their Ph.D. qualifying or comprehensive verbal and written exams (generally third-year students) to acquire hands-on scientific training and develop professional maturity for independent research. Applicants must be full-time, currently enrolled students in a Ph.D. program in the physical or biological sciences, pursuing thesis research based on the use of synchrotron radiation. For more information and to apply, go to <http://www-als.lbl.gov/als/fellowships/index.html>

Stanford-Berkeley Summer School on Synchrotron Radiation: August 17-22, 2008

The sixth Stanford-Berkeley summer school will provide basic lectures on the synchrotron radiation process, requisite technologies, and a broad range of scientific applications. The summer school will be housed on the Stanford University campus. Co-chairs are Professors Anders Nilsson and David Attwood. Visits to both the Stanford Synchrotron Radiation Laboratory (SSRL) and the Advanced Light Source (ALS) in Berkeley will be included, with opportunities to interact with the professional staff and graduate students at both facilities. For more information and instructions on how to apply go to <http://www-ssrl.slac.stanford.edu/sbsummerschool/>.

New Directions in X-Ray Light Sources

ALS Director Roger Falcone is featured speaking ultrafast x-ray pulses on Berkeley Lab YouTube in the fourth in this year's series of summer lectures. To view, go to http://www.youtube.com/watch?v=6bW_5nrITjc .

7. ALS-RELATED WEB NEWS AND LINKS

X-ray diffraction looks inside aerogels in 3-D

<http://www.lbl.gov/publicinfo/newscenter/features/2008/ALS-3D-aerogels.html>

Ebola spiked

<http://www.spectroscopynow.com/coi/cda/detail.cda?id=19124&type=Feature&chId=8&page=1>

House Appropriations Bill for Office of Science

<http://www.aip.org/fyi/2008/076.html>

UCLA researchers clarify function of glucose transport molecule

<http://lightsources.org/cms/?pid=1002846>

A plus and a minus for EUV litho research

http://www.laserfocusworld.com/display_article/332673/12/none/none/TECHN/A-plus-and-a-minus-for-EUV-litho-research

8. OPERATIONS UPDATE

(Contact: Dave Richardson, DBRichardson@lbl.gov)

For the user runs from June 17 to July 14, the beam reliability (time delivered/time scheduled) was 87.1%. Of the scheduled beam, 74.3% was delivered to completion. Beam time was lost due to faults in multiple subsystem categories, including waterflow faults, interlock trips, power supply faults, and general AC power variations.

Questions about beam reliability should be sent to Dave Richardson. Requests for special operations use of the "scrubbing" shift should be sent to Rick Bloemhard (ALS-CR@lbl.gov, x4738) by 1:00 p.m. Friday.

Long-term and weekly operations schedules are available on the Web At <http://www-als.lbl.gov/als/schedules/index.html> . Requests for Special operations use of the "scrubbing" shift should be sent to Rick Bloemhard (ALS-CR@lbl.gov, x4738) by 1:00 p.m. Friday. A Web page showing the ring status in real time can be found at <http://www-als.lbl.gov/als/status/> .

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ALSNews is a monthly electronic newsletter to keep users informed about developments at the Advanced Light Source, a national user facility located at Ernest Orlando Lawrence Berkeley National Laboratory, University of California. The current and past issues of ALSNews are available on the World Wide Web. Point your browser to the following URL:

http://www-als.lbl.gov/als/als_news/

To subscribe, unsubscribe, or change your delivery address for the email version of ALSNews, send a message indicating your wishes and including your name and email address to alsnews@lbl.gov. We welcome suggestions for topics and content.

LBNL/PUB-948 (2008)

Editors: jmccullough@lbl.gov, lstamura@lbl.gov, ejmoxon@lbl.gov

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Current issue online at http://www-als.lbl.gov/als/als_news/

1. INFLUENCE OF DOMAIN WALL PINNING ON THE DYNAMIC BEHAVIOR OF MAGNETIC VORTICES

(Contact: Arne Vansteenkiste, Arne.Vansteenkiste@UGent.be)

Soft magnetic, micron-sized thin-film structures with magnetic vortices are intriguing systems that may one day be used in ultrafast computer memories. In such systems, the otherwise in-plane magnetization turns perpendicular to the plane at the center of the vortex, forming the vortex core. Because such a core has two possible polarizations (up or down) and can be switched between these two states by a small alternating magnetic field, it could serve as a memory bit in future magnetic memory devices. However, these magnetic structures often contain numerous imperfections such as domain wall pinning sites, which have to be taken into account for the practical application of such systems. To study how these defects affect the dynamics of magnetic vortices, researchers from Belgium, Germany, and the United States investigated square-shaped and disk-shaped thin-film structures with artificially introduced imperfections in the form of nanometer-sized holes. They used time-resolved scanning transmission x-ray microscopy (STXM) at ALS Beamline 11.0.2 to determine the frequency at which these vortices vibrate (their eigenfrequency). The imperfections were found to cause a higher vibrational frequency in square-shaped structures, but did not influence the disk-shaped structures. Knowledge of the frequency is crucial for vortex-based memories, since the electric signal for writing data needs to be precisely tuned to it.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/172vortices.html

Publication about this research: A. Vansteenkiste, J.D. Baerdemaeker, K.W. Chou, H. Stoll, M. Curcic, T. Tyliczszak, G. Woltersdorf, C.H. Back, G. Schutz, and B.V. Waeyenberge, "Influence of domain wall pinning on the dynamic behavior of magnetic vortex structures: Time-resolved scanning x-ray transmission microscopy in NiFe thin film structures," Phys. Rev. B 77, 144420 (2008).

2. PHOTONS ON DEMAND: A NEW BUNCH-KICKING MODE AT THE ALS

(Contacts: Greg Portmann, GJPortmann@lbl.gov; Peter Fischer, PJFischer@lbl.gov; and Dave Robin, DSRobin@lbl.gov)

The ALS has a difficult task to fulfill: provide the best beam to a huge variety of experiments. It is not surprising the demands are as diverse as the experiments. Time-resolved research, which is scientifically highly rewarded, often requires two-bunch operation. However, two-bunch is only provided twice a year at the ALS (approximately 20 days total). This is because the majority of researchers do not require this timing structure for their experiments and are therefore dissatisfied with the much-reduced flux. This dilemma might be resolved for some experiments by a recently developed technique called pseudo single bunch. By using a pulsed magnet, one bunch in the train, the so-called camshaft bunch, is vertically kicked onto a different orbit from the rest of the bunches. If that bunch can be spatially separated in the beamline, then some beamlines can be using a multibunch beam while others are using only a single bunch. This simultaneous use would be in effect "two synchrotrons in one."

The full-field high-resolution soft x-ray microscope at Beamline 6.1.2 recently demonstrated that it can use this new mode to study fast spin dynamics in nanostructured magnetic elements. This scientific area is of the utmost relevance both for fundamental and technological reasons (in view of the quest to make magnetic memory devices not only smaller but faster). In addition, during a recent test experiment on Beamline 6.1.2, the camshaft bunch was displaced vertically by about 500 microns. By adjusting the x-ray optics in the microscope to this new source position, the magnetic contrast in a ferromagnetic GdFe alloy thin film switched on and off synchronously with the switching of the fast kicker, thus demonstrating that switching between single and multibunch imaging is possible without requiring any changes in the storage ring.

Other experiments could also benefit from the new scheme. One remaining question is the degree to which experiments running in the conventional multibunch mode are sensitive to the displaced camshaft bunch. However, by installing multiple fast magnets, it would be possible to isolate the perturbation to specific sections of the accelerator, thereby avoiding areas that are particularly sensitive to asymmetric beam profiles.

3. XRM 2008 A ROUSING SUCCESS

(Contact: Janos Kirz, JKirz@lbl.gov)

The x-ray microscopy community came together in Zurich, Switzerland, from July 21 to July 25 for the 9th International Conference on X-Ray Microscopy (XRM 2008,

<http://xrm2008.web.psi.ch/>), sponsored this year by the Paul Scherrer Institute. Held every three years since 1984, XRM is a forum for the presentation and discussion of advances in high-spatial-resolution x-ray imaging applications, methods, and instrumentation. Thanks to advances in synchrotron and laboratory based x-ray sources and to improvements in x-ray optics, matter can now be investigated down to spatial scales of a few 10 nm. This year, XRM 2008 also featured non-x-ray based microscopy techniques. The conference was very well attended, with 325 participants from around the world, and the diversity of presentations reflected the rapid advances occurring in the field. Nine of the 38 talks were given by ALS users, including Harald Ade of North Carolina State University ("Microscopy on Polymers: From Science to Applications"); Peter Fischer of Berkeley Lab ("Time Resolved Soft X-Ray Microscopy of Current-Induced Resonant Magnetic Vortex Core Motion in a Ferromagnetic Disk"); Adam Hitchcock of McMaster University, Canada ("STXM Tomography"); Janos Kirz of Berkeley Lab ("The History and Future of X-Ray Microscopy"); Carolyn Larabell of Berkeley Lab ("Quantitative 3D Imaging of Eukaryotic Cells Using Soft X-Ray Tomography"); and Hermann Stoll of the Max Plank Institute ("Magnetization Dynamics in Nanostructures").

Another highlight of the conference was the presentation of the memorial Werner Meyer-Ilse award to ALS scientist Anne Sakdinawat (see article below) for her development of modified zone plates for phase contrast and high depth of focus applications and to Pierre Thibault (Paul Scherrer Institute) for his pioneering work in coherent diffraction imaging and ptychography.

4. CXRO SCIENTIST AND ALS USER ANNE SAKDINAWAT WINS 2008 WERNER MEYER-ILSE AWARD

(Contact: David Attwood, DTAttwood@lbl.gov)

At the International X-Ray Microscopy meeting, XRM 2008, in Zurich, Switzerland, Anne Sakdinawat was presented with the prestigious Werner Meyer-Ilse Award (along with co-recipient Pierre Thibault of the Paul Scherrer Institute). The award is presented every third year for contributions to the development of x-ray microscopy. Anne was honored "for the development of modified zone plates for phase contrast and high depth of focus applications." She received her Ph.D. from the University of California, Berkeley, Department of Bioengineering; has been at Berkeley Lab's Center for X-Ray Optics (CXRO) for the past five years; and is also a member of the ALS Users' Executive Committee (UEC). Her research was performed at ALS Beamlines 6.1.2 and 12.0.2.

Anne Sakdinawat has pursued a wide array of techniques that will improve x-ray microscopy, including phase and resolution enhancements to zone-plate-based microscopy, massively parallel redundant array holography, and lensless diffractive imaging. Her paper for the conference, "Specialized Diffractive Optics for Contrast Resolution Enhancement," presents experimental results and optics fabrication methods to improve contrast and resolution for x-ray imaging studies. These include the development of diffractive lenses that combine a Fresnel zone plate with a specific phase structure, allowing imaging and filtering to be performed within a single lens, enhancing contrast or resolution while keeping alignment simple.

Go to http://www.cxro.msd.lbl.gov/diffractive_optics/ to view Anne's research as well as images of some of her unusual zone plates.

5. UEC CORNER

by Hendrik Ohldag

(Contact: Hendrik Ohldag, hohldag@stanford.edu)

2008 Users' Meeting

The submission deadlines for the upcoming ALS Users' Meeting (October 13-15) are approaching fast; therefore, I would like to bring to your attention two agenda items for which we need your contributions. One of the most exciting features of each ALS Users' Meeting is the evening of the poster session, where everybody comes together and has a chance to see what their colleagues are doing and stimulating discussions can be overheard throughout. To make this session a success, we ask you to go to the Users' Meeting Web site (<http://www-als.lbl.gov/als/usermtg/abstracts.html>) and submit an abstract. Another important item on the program agenda are the awards given out annually by the ALS UEC. Go to the ALS Users' Meeting Awards page (<http://www-als.lbl.gov/als/usermtg/awards.html>) and fill out the form to nominate individuals or groups for the David A. Shirley Award for Outstanding Scientific Achievement at the ALS, the Klaus Halbach Award for Innovative Instrumentation at the ALS, or the Tim Renner User Services Award for Outstanding Support to the ALS User Community. The deadline for award nominations is Friday, September 19. The current meeting agenda, which includes a special session to remember former ALS director Daniel Chemla, can be found at <http://www-als.lbl.gov/als/usermtg/agenda.html> . During this session, DOE Deputy Director for Science Patricia Dehmer, former LBNL Director Charles Shank, and LBNL Associate Laboratory Director Paul Alivisatos will share with us their memories of Daniel.

The UEC Needs New Members

After the Users' Meeting, you will have the chance to elect three new members to the UEC, who will replace the representatives whose terms expire at the end of this year. Please contact me (hohldag@stanford.edu) if you are interested in being a member. We are specifically looking for candidates from the area of structural and molecular biology since this group is not represented at this time. A list of current UEC members can be found on the UEC Web site at <http://www.alsuec.org/index.html> .

6. COMPASS STUDENTS TOUR THE ALS

(Contact: Liz Moxon, EJMoxon@lbl.gov)

On Friday, August 15, nineteen incoming freshman students from the Physics, Astronomy, and Earth and Planetary Sciences departments at UC Berkeley visited the ALS to get an inside view of an active research facility. The students are participants in the Compass Project (<http://compass.physics.berkeley.edu/index.php>), a unique preparatory program to support diversity in the sciences at the university. Division Director Roger Falcone welcomed the group

to the ALS and gave a brief overview of the facility. The students were then guided around the experiment floor by beamline scientist Mike Martin and CXRO scientists Anne Sakdinawat and Andy Aquila.

7. BULLETIN BOARD

Top-Off Update

As the ALS nears readiness for top-off operation, here is the planned schedule:

Top-Off Testing. Some testing of top-off on approved beamlines will occur during accelerator physics shifts beginning in October 2008 and extending through the end of the calendar year. We expect that the majority of beamlines will be approved for testing in October and all by the end of the first week in January.

Date for First Full Top-Off Operation. Assuming successful tests and the approval of all beamlines, the ALS will begin to operate in top-off mode on a routine basis in January 2009.

New General ALS Requirement: Closed-Toe Shoes

The ALS safety advisory on the use of personal protective equipment (PPE) at the ALS was revised on August 12, 2008. Among other updates to this advisory, it is now mandatory that all staff, users, and visitors wear closed-toe shoes on the experimental floor, accelerator area, and all peripheral lab areas. Go to the PPE Advisory Web page (<http://www-als.lbl.gov/als/user-advis/21-personalProtection.html>) to read this user advisory in its entirety.

8. ALS-RELATED WEB NEWS AND LINKS

X-rays use diamonds as window to center of the earth
<http://www.sciencedaily.com/releases/2008/08/080812100333.htm>

Two years after the launch, scientific results are trickling in
http://www.planetary.org/programs/projects/stardustathome/stardustathome_20080811.html

No interstellar dust yet found in stardust samples
<http://space.newscientist.com/article/dn14482-no-interstellar-dust-yet-found-in-stardust-samples.html>

Surpassing nature, scientists bend light backward
http://www.nytimes.com/2008/08/12/science/12ligh.html?_r=2&ref=science&oref=slogin&oref=slogin

Scientists produce unique x-ray holograms

http://www.upi.com/Science_News/2008/08/05/Scientists_produce_unique_X-ray_holograms/UPI-73571217956203/

9. OPERATIONS UPDATE

(Contact: Dave Richardson, DBRichardson@lbl.gov)

For the user runs from July 15 to August 17, the beam reliability (time delivered/time scheduled) was 91.2%. Of the scheduled beam, 85.9% was delivered to completion. This period included the nine-day period of 2-bunch user operations (from August 8 to August 10). Injection difficulties that began around 1:00 a.m. on August 4 (during the 2-bunch run) resulted in a loss of about eight hours of user beam time.

Questions about beam reliability should be sent to Dave Richardson. Requests for special operations use of the "scrubbing" shift should be sent to Rick Bloemhard (ALS-CR@lbl.gov, x4738) by 1:00 p.m. Friday.

Long-term and weekly operations schedules are available on the Web At <http://www-als.lbl.gov/als/schedules/index.html> . Requests for Special operations use of the "scrubbing" shift should be sent to Rick Bloemhard (ALS-CR@lbl.gov, x4738) by 1:00 p.m. Friday. A Web page showing the ring status in real time can be found at <http://www-als.lbl.gov/als/status/> .

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http://www-als.lbl.gov/als/als_news/

To subscribe, unsubscribe, or change your delivery address for the email version of ALSNews, send a message indicating your wishes and including your name and email address to alsnews@lbl.gov. We welcome suggestions for topics and content.

LBNL/PUB-948 (2008)

Editors: jmccullough@lbl.gov, Istamura@lbl.gov, ejmoxon@lbl.gov

This work was supported by the Director, Office of Science, Office of Basic Energy Sciences, of the U.S. Department of Energy under Contract No. DE-AC02-05CH11231.

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Current issue online at http://www-als.lbl.gov/als/als_news/

1. DIRECTOR'S UPDATE: LOOKING TO THE FUTURE: A RENEWED ALS STRATEGIC PLAN

(Contact: Roger Falcone, RWFalcone@lbl.gov)

The ALS Strategic Plan is a document that was developed in careful consultation with our users and advisory committees over several years. Recently, we have taken a renewed look at our Strategic Plan to ensure that it is both comprehensive and bold in meeting users' needs. A draft of the updated Plan reflects input from senior ALS ac managers, the Science Advisory Committee (SAC), the Users' Executive Committee (UEC), and ALS beamline scientists. The result of this fresh examination will soon be available online for your review and comments. If you are not yet on our email list or need to update your email address, please contact us at ALSNews@lbl.gov. This will ensure that you are notified when the Strategic Plan is available for viewing.

In the coming months, we are looking forward to sharing the revised Strategic Plan with the Department of Energy, and working with the DOE and other potential funding sources to identify the resources we will need to renew the ALS.

2. ISOTOPE AND TEMPERATURE EFFECTS IN LIQUID WATER PROBED BY SOFT X RAYS

(Contact: Monika Blum, monika.blum@physik.uni-wuerzburg.de)

The geometric structure of liquid water has been investigated in detail by many techniques, but many details are still under debate, such as the actual number of hydrogen bonds (at a given time) between the various water molecules. Even less is known about the electronic structure.

Since it is the intermittent bonding between water molecules that gives liquid water its peculiar characteristics, the electronic structure plays a crucial role in understanding the properties of the liquid state. Consequently, information essential for insight into chemical and biological processes in aqueous environments is lacking. To address this need, researchers from Germany and the U.S. have used soft x-ray spectroscopy at the ALS to gain detailed insight into the electronic structure of liquid water. Their spectra show a strong isotope and a weak temperature effect, and, for the first time, a splitting of the primary emission line in x-ray emission spectra. By making use of the internal "femtosecond clock" of the core-hole lifetime, a detailed picture of the electronic structure can be painted that involves fast dissociation processes of the probed water molecules.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/173liquid-water.html

Publications about this research: O. Fuchs, M. Zharnikov, L. Weinhardt, M. Blum, M. Weigand, Y. Zubavichus, M. Bär, F. Maier, J.D. Denlinger, C. Heske, M. Grunze, and E. Umbach, "Isotope and temperature effects in liquid water probed by x-ray absorption and resonant x-ray emission spectroscopy," *Phys. Rev. Lett.* 100, 027801 (2008) and *Phys. Rev. Lett.* 100, 249802 (2008).

3. CHARACTERIZATION OF SELECTIVE BINDING OF ALKALI CATIONS WITH CARBOXYLATE

(Contact: Janel Uejio, uejioj@berkeley.edu)

During its lifetime, a cell spends a considerable fraction of its energy pumping sodium and calcium out and potassium in. This balancing process is similar to that found in the coils of the DNA double helix, where specific ions nestle and help stabilize this macromolecule. These are only two examples of selective ion interactions in biology; there are many others also vital to life. The existence of these interactions has been known since the early 20th century, when Franz Hofmeister observed that some salts (ionic compounds) aided the solution of proteins in egg, some caused proteins to destabilize and precipitate, and others ranged in activity between the two extremes. Hofmeister then ranked "salt-out" (destabilizing) ions versus "salt-in" (stabilizing) ions according to the magnitude of their effects (the "Hofmeister effects"). However, despite enormous effort, why certain interactions are preferred over others is not completely understood. Recently, a team of researchers from UC Berkeley used the model systems of acetate and formate (two simple carboxylic acids) with a series of cations to test predictions made in the literature for preferential interactions. Near-edge x-ray absorption fine structure (NEXAFS) spectroscopy was used as this technique is highly sensitive to the chemical environments around a molecule. Experiments at ALS Beamline 8.0.1 confirmed strengthening of the interaction between the cations and the carboxylate group in the following order: potassium, sodium, and lithium.

Read the full story at

http://www-als.lbl.gov/als/science/sci_archive/176ion-interaction.html

Publication about this research: J.S. Uejio, C.P. Schwartz, A.M. Duffin, W.S. Drisdell, R.C. Cohen, and R.J. Saykally, "Characterization of selective binding of alkali cations with carboxylate by x-ray absorption spectroscopy of liquid microjets," PNAS 105, 6809 (2008).

4. UEC CORNER

by Hendrik Ohldag

(Contact: Hendrik Ohldag, hohldag@stanford.edu)

2008 Users' Meeting

We are very excited that California Democratic Congresswoman Lynn Woolsey has accepted our invitation to speak at this year's meeting. Representative Woolsey is a member of the House Committee on Science and Technology, and we are therefore particularly looking forward to her presentation. The complete agenda of the meeting, which includes a session to remember former ALS director Daniel Chemla, can be found at <http://www-als.lbl.gov/als/usermtg/agenda.html> . I would also like to draw your attention to the Town Hall Meeting (scheduled for the first afternoon of the meeting), during which members of ALS management as well as representatives from the American Physical Society will be present to answer your questions about the ALS.

WASHINGTON DC VISIT

The Materials Research Society organized a Congressional Visits Day (CVD) on September 17, during which representatives from user facilities and universities across the U.S. had the opportunity to talk with their representatives and senators about the current funding situation for the physical sciences in the U.S. The CVDs are an invaluable opportunity for us to communicate the needs of the scientific community to policy makers. If you would like to know more about CVDs, please contact me at hohldag@stanford.edu .

Become a UEC Member

Following the upcoming Users' Meeting, you will have the opportunity to elect three new members to the UEC, who will replace the representatives whose terms will expire at the end of this year. Please email me if you are interested in serving on the UEC. We are especially interested in candidates from the area of structural and molecular biology, since this group is currently not represented. A list of the existing UEC members can be found at <http://www.alsuec.org/index.html>.

5. SUBMIT YOUR PUBLICATIONS AS SOON AS POSSIBLE!

(Contact: alsuser@lbl.gov)

If you have recently published any ALS-related work in a scientific journal, conference proceedings, or book chapter; received a patent based on work done at the ALS; completed a Ph.D. thesis; received an award; or given a lecture please let us know as soon as possible so that your work can be reported to the DOE.

To submit publications, go to the ALS Publications Submission Web page:
http://alsusweb.lbl.gov/4DCGI/WEB_GetForm/PublicationSubmit.shtml/Initialize

To avoid duplication of publications, we suggest you first go to the Publication Search page (http://alsusweb.lbl.gov/4DCGI/WEB_GetForm/PublicationSearch.shtml/Initialize) to determine whether your publications are already in the database

Remember, publications are a primary metric used by DOE in the funding process. If it's on your CV and all or part of the work was done at the ALS, it should be in our database!

6. ALS SCIENTIST SIMON MORTON PART OF "FIRST LIGHT" TEAM AT THE AUSTRALIAN SYNCHROTRON

Simon Morton, Berkeley Center for Structural Biology optics and beamline scientist, was part of the team that commissioned the very first beamline on the Australian Synchrotron (and hence the first beamline in Australia) in March of last year. This year they invited him back for "wave 2," the commissioning of the second set of three beamlines. Simon led the protein crystallography commissioning team that achieved first light on the facility's second PX beamline on August 13, 2008.

7. ALS-RELATED WEB NEWS AND LINKS

St. Jude study gives new insights into how cells accessorize their proteins
<http://www.lightsources.org/cms/?pid=1003018>

Improving our ability to peek inside molecules
<http://www.lightsources.org/cms/?pid=1003006>

New clues to oxygen at the origin of the solar system
<http://www.sciencedaily.com/releases/2008/09/080915134903.htm>

Seeing the shape of gene silencing
<http://www.lightsources.org/cms/?pid=1003005>

Sun's role in formation of the solar system questioned
<http://www.newspostonline.com/sci-tech/suns-role-in-formation-of-the-solar-system-questioned-200809074366>

Tracking down the menace in Mexico City smog
<http://www.lbl.gov/publicinfo/newscenter/pr/2008/MILAGRO/>

8. OPERATIONS UPDATE

(Contact: Dave Richardson, DBRichardson@lbl.gov)

For the user runs from August 20 to August 31, the beam reliability (time delivered/time scheduled) was 88.4%. Of the scheduled beam, 76.4% was delivered to completion. Problems with the injection system (including multiple replacements of a thyatron tube for the booster injection kicker) resulted in significant loss in beam time.

Questions about beam reliability should be sent to Dave Richardson. Requests for special operations use of the "scrubbing" shift should be sent to Rick Bloemhard (ALS-CR@lbl.gov, x4738).

Long-term and weekly operations schedules are available on the Web at <http://www-als.lbl.gov/als/schedules/index.html> . View the ring status in real time at <http://www-als.lbl.gov/als/status/> .

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To subscribe, unsubscribe, or change your delivery address for the email version of ALSNews, send a message indicating your wishes and including your name and email address to alsnews@lbl.gov. We welcome suggestions for topics and content.

LBNL/PUB-948 (2008)

Editors: jmccullough@lbl.gov, lstamura@lbl.gov, ejmoxon@lbl.gov

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1. THE 2008 ALS USERS' MEETING: A 15TH ANNIVERSARY CELEBRATION

This year's ALS Users' Meeting, held on October 13-15, looked back on several notable achievements over the past year, including the successful triennial Department of Energy Office of Basic Energy Sciences (BES) Review, full-energy injection (from 1.5 to 1.9 GeV), increased photon flux (from 400 mA to 500 mA), the near completion of top-off (ETA early 2009), the installation of the MERLIN insertion device, and the installation and successful testing of the quasi-single-bunch operation system. Approximately 400 people attended the conference, which included plenary and poster sessions, a student poster competition, and ten workshops (including a joint ALS/SSRL workshop). At the banquet, held on Tuesday, October 14, awards were presented for scientific achievement, instrumentation, user services, and student posters. Thanks go to program co-chairs Wayne Stolte and Phil Heimann for organizing this 15th anniversary meeting.

Read the full story at <http://www-als.lbl.gov/als/usermtg/index.html>.

2. DIRAC CHARGE DYNAMICS IN GRAPHENE BY INFRARED SPECTROSCOPY (Contact: Zhiqiang Li, zhiqiang@physics.ucsd.edu)

Graphene--a single layer of carbon atoms arranged in a honeycomb lattice--has very high conductivity that can be tuned by applying a gate voltage. The charge carriers in graphene can travel ballistically over great distances (about 1 micron) without scattering. These unusual electronic properties make graphene a promising candidate for future nanoelectronics. Using

infrared spectromicroscopy at ALS Beamline 1.4, a group of researchers from the University of California at San Diego, Columbia University, and the ALS has succeeded in probing the dynamical properties of the charge carriers in graphene with an accuracy never before achieved. Their results have uncovered signatures of many-body interactions in graphene and have demonstrated the potential of graphene for novel applications in optoelectronics.

Read the full story at:

http://www-als.lbl.gov/als/science/sci_archive/174grapheneIR.html

Publication about this research: Z.Q. Li, E.A. Henriksen, Z. Jiang, Z. Hao, M.C. Martin, P. Kim, H.L. Stormer, and D.N. Basov, "Dirac charge dynamics in graphene by infrared spectroscopy," *Nature Physics* 4, 532 (2008).

3. FACILITY FEATURE: WATCHING ELECTRONS DO CHEMISTRY IN LIQUIDS: TIME-RESOLVED SOFT X-RAY SPECTROSCOPY OF SOLVATED MOLECULES

by Nils Huse and Robert Schoenlein

(Contacts: Nils Huse, NHuse@lbl.gov; Robert Schoenlein, RWSchoenlein@lbl.gov)

Ultrashort laser pulses can follow chemical reaction kinetics in real time, but extracting quantitative information on the evolving molecular and electronic structure from optical measurements remains a major challenge. In recent years time-resolved laser spectroscopy and established x-ray methods have been combined to create new tools, which are used to directly probe the local electronic and molecular structure in time and energy. Hard x rays are typically used to probe atomic arrangements through scattering and K-edge spectroscopy; soft x rays, sensitive to valence-charge distributions, hold tremendous potential for following the formation and dissolution of chemical bonds in real time. The information gleaned from ultrafast x-ray probes is essential to understand the cooperative relationship between electronic charge distributions, atomic rearrangement, and the formation of new molecular structures. It is particularly effective for understanding molecular dynamics in solution, where much important chemistry occurs and where the solvent environment substantially influences reaction dynamics through interaction with the valence charge distribution.

Using the recently commissioned ALS Beamline 6.0.2, we have applied time-resolved soft x-ray spectroscopy at the Fe L3 edge to reveal the electronic dynamics of an ultrafast Fe(II) spin transition in solution. We measured the absorption of the low- and high-spin states after the photoinduced metal-to-ligand charge transfer. These are to our knowledge the first time-resolved transmission spectra of solvated molecules ever recorded in the soft x-ray region. Full story.

Read this feature in its entirety at

http://www-als.lbl.gov/als/_news/features/featureTimeResolved.html.

4. UEC CORNER

by Hendrik Ohldag

(Contact: Hendrik Ohldag, hohldag@stanford.edu)

Thank You for a Wonderful Users' Meeting!

I would like to thank all of you for your participation in the 2008 ALS Users' Meeting. From the conversations I had during the meeting as well as from comments I received afterwards, it seems as if everyone had a wonderful time and enjoyed the program. In particular, many of you pointed out how well the Daniel Chemla memorial session was received and how much you appreciated the memories shared by the speakers during the session. Also very well received was the keynote address by Congresswoman Lynn Woolsey, the town hall meeting on Monday afternoon, and the awards session, which featured three outstanding talks by the award winners James Berger (Shirley), Eric Gullikson (Halbach), and Joanna Bettinger (Best Student Poster). Finally, the poster session, held on Monday evening during the reception sponsored by our vendors, featured more than 70 contributions from ALS users. It was a true pleasure to see the ALS patio buzzing with excitement.

Let me also say a big THANK YOU to Phil Heimann, Wayne Stolte, and the ALS staff for an excellent meeting. If you have any comments or suggestions for future meetings, please send me an email (hohldag@stanford.edu) so that we can discuss your ideas at our next UEC meeting on November 3.

Vote Now

At the end of 2008, the terms of three representatives on the Users' Executive Committee will come to an end. I would like to use this opportunity to thank Elke Arenholz, Alessandra Lanzara, and Tony van Buuren for their valuable contributions to the user community over the past three years. Eight ALS users from universities and facilities across the U.S. have been selected as candidates to take their place and represent your interests from 2009-2011. Vote online now for the three candidates of your choice using the online voting form at <http://www-als.lbl.gov/als/uec/vote/> . You can find their biographies at <http://www-als.lbl.gov/als/uec/vote/biographies.html> . Voting will close on November 10.

5. DEBORAH SMITH MOVES OVER TO THE USER SERVICES OFFICE

Deborah Smith, formerly of the ALS Experimental Systems Group, has joined the ALS User Services Office, <http://www-als.lbl.gov/als/quickguide/useroffice.html> , as senior administrator. The User Services Office is the first "face" new users see when they come to the ALS. Along with User Office staff members Carmen Escobar, Sharon Fujimura and Valerie Wysinger, and User Services Group Leader Susan Bailey, Deborah serves the more than 2100 users who come to the ALS each year. "Our job is to register users, make sure they are up to date on their training, especially with regards to safety, and brief them on what's required before going on the floor," declares Deborah. "Users need to register two weeks before arriving at the ALS and complete their training before they begin work, but the good news is that almost all of it can all

be done online [<http://www-als.lbl.gov/als/quickguide/registration.html>] ." Deborah and the rest of the User Services team make it fast and easy for scientists to get through the registration process.

Before coming to the Lab, Deborah worked at an HVAC engineering firm that did tenant improvement in San Francisco. When she arrived the Lab in 2005, she discovered that she loved it. "This place is its own city, and the science done here has a tremendous impact." She started out in Computing Sciences, then did a stint in EH&S before finding her home at the ALS.

"The scientists here are really passionate about what they do, and they energize me to do what I do." Deborah is located in the User Services Office in Building 6, Room 2212E, and her door is always open. You can also contact her by email at DASmith@lbl.gov or telephone at 510-495-2001.

6. CXRO SCIENTISTS STAR AT NANOCHIP SYMPOSIUM

(Contact: David Attwood, DTAttwood@lbl.gov)

SEMATECH, the Semiconductor Manufacturing Technology consortium, held an International Symposium on EUV Lithography last month at Lake Tahoe to explore the future of computer chip manufacturing. Chris Anderson and Patrick Naulleau of the Center for X-Ray Optics (CXRO), with colleague Thomas Wallow of Advanced Micro Devices, won the Best Paper award for their discussion of nanoscale patterning, using 13.5-nm wavelength extreme ultraviolet light (EUV) at ALS Beamline 12.0.1. Chris Anderson is a UC Berkeley graduate student in Applied Science and Technology. As cochair of the symposium, Naulleau also presented an overview of North American EUV research. Read more at <http://www.sematech.org/corporate/news/releases/20081014b.htm> .

7. CROSSCUTTING REVIEW OF ENVIRONMENTAL SCIENCE AT THE ALS

(Contact: David Shuh, DKShuh@lbl.gov)

The Crosscutting Review of Environmental Science at the ALS took place over a two-day period on October 9-10, 2008. The distinguished committee for the review consisted of Ingrid Pickering (Chair, University of Saskatchewan), Paul Fenter (Argonne National Laboratory), John Parise (Stony Brook University), David Vaughan (University of Manchester), and John Zachara (Pacific Northwest National Laboratory). The plenary speakers at the review covered a diverse range of topics in environmental science that had been addressed using the unique characteristics of the ALS and included Gordon Brown, Jr. (Stanford University/SSRL), Alain Manceau (University of Grenoble), Brandy Toner (University of Minnesota Twin, Cities), and Andrew Westphal (University of California at Berkeley). The plenary sessions were followed by specific scientific presentations of results from ALS beamlines that have ongoing environmental sciences activities and from those beamlines that anticipate substantial use for environmental science in the near future.

During the review, all of the speakers highlighted compelling science that could be performed at the ALS in the future and comprehensively addressed the needs for upgrades, improvements, and future beamlines to serve the needs of the environmental science community now and into the future. A working lunch for both current and prospective ALS environmental sciences users and the review committee was held on the first day without ALS management present, providing an open forum for direct environmental science community discussion and input.

8. BULLETIN BOARD

ALS Fall Shutdown a Success

Another safe and successful ALS shutdown is in the books. The User Support Building Project was able to complete the work thought to most likely cause vibration problems for users, which included the excavation of the site, import and compaction of engineered fill, and the drilling and placement of 51 piers. The third of four phases of a seismic retrofit of the ALS dome was also completed. A significant number of technical projects were accomplished, including the installation of 14 apertures to enable safe top-off operation; a removal, repair, and reinstallation of the in-vacuum insertion device in the straight section of Sector 6, and a safety improvement to the superbend magnets. Many other tasks were also completed, and once again we owe great thanks to our technical staff for their diligent and safe work.

ALS Spectrum Debuts October 13

A new publication from the ALS debuted the ALS Users' Meeting and is now available online. "ALS Spectrum" (http://www-als.lbl.gov/als/publications/ALS_Spectrum.pdf) encapsulates the same type of information contained in the ALS Activity Report but in a short, readable, newsletter-like format. Featured scientific and facility developments are front-paged, and a roundup of science highlights is provided in easily browsable summaries with Web links. Contents also include brief reports from ALS staff and user groups, articles about ALS people and events, and facility updates.

Editor Lori Tamura of the ALS Communications group spearheaded the project, and Berkeley Lab's Creative Services Office designed the layout.

9. ALS-RELATED WEB NEWS AND LINKS

Secret Lives of Catalysts Revealed

<http://newscenter.lbl.gov/press-releases/2008/10/21/catalysts/>

Modelling the Atomic and Void Structures of Amorphous Materials

<http://www.azonano.com/news.asp?newsID=8093>

New Tools That Model 3D Structure of Amorphous Materials to Transform Technology Driven R&D

<http://www.sciencedaily.com/releases/2008/10/081014111405.htm>

Structure of Mre11 Protein Bound to DNA: First Glimpse of a Key DNA Repair Protein at Work
<http://newswire.ascribe.org/cgi-bin/behold.pl?ascribeid=20081002.152759&time=15%2055%20PDT&year=2008&public=0>

10. OPERATIONS UPDATE

(Contact: Dave Richardson, DBRichardson@lbl.gov)

For the user runs from October 11 to 19 the beam reliability (time delivered/time scheduled) was 93.1%. Of the scheduled beam, 90.5% was delivered to completion.

Questions about beam reliability should be sent to Dave Richardson. Requests for special operations use of the "scrubbing" shift should be sent to Rick Bloemhard (ALS-CR@lbl.gov, x4738).

Long-term and weekly operations schedules are available on the Web at <http://www-als.lbl.gov/als/schedules/index.html> . View the ring status in real time at <http://www-als.lbl.gov/als/status/> .

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LBNL/PUB-948 (2008)

Editors: jmccullough@lbl.gov, Istamura@lbl.gov, ejmoxon@lbl.gov

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Current issue online at http://www-als.lbl.gov/als/als_news/

1. THE ALS PREPARES FOR DOE OFFICE OF HEALTH, SAFETY, AND SECURITY (HSS) AUDIT

by Roger Falcone, ALS Division Director, and Jim Floyd, ALS EH&S Program Manager
(Contacts: Roger Falcone, RWFalcone@lbl.gov, and Jim Floyd, JGFloyd@lbl.gov)

On Monday, November 17, 2008, the ALS held a division-wide safety stand-down. The day-long event started off with group meetings, which included reviews of training, Job Hazard Questionnaires, and Integrated Safety Management; safety presentations; and discussions of what to expect at the upcoming Health, Safety, and Security (HSS) audit. Time was set aside for "housekeeping," in which ALS employees and users reviewed their work sites and offices for safety compliance. Mock interviews and inspections throughout the day assessed individuals' understanding of their role in safety. All of these events were designed to raise the bar on safety knowledge, awareness and compliance, and kick-start the ALS's preparation for the HSS audit, which will be performed by the HSS Office of Independent Oversight.

The Laboratory-wide audit will take place during the weeks of January 26 through February 6, 2009. There will be a preliminary scoping visit on December 3-4, 2008, and a more intensive planning visit between January 6 and 8, 2009. The audit is part of a review of all DOE labs by the HSS office; Berkeley Lab is the last to be reviewed.

ALS users as well as employees are subject to the audit. The auditors will evaluate both our ability to explain our safety systems and the actual physical controls. ALS users need to demonstrate knowledge of their Experiment Safety Sheets and be able to answer questions about the nature of their work, the hazards associated with that work, any hazard analysis they have conducted, what controls are in place to mitigate or eliminate these hazards, as well as their personal responsibility in this process.

For more information on safety at the ALS, visit the ALS Safety Web Site (<http://www.als.lbl.gov/als/safety/>). If you have any questions about the upcoming audit, please contact the ALS EH&S Program Administrator (TGock@lbl.gov or 510-486-5013), or visit the ALS Safety Staff Web page at <http://www.als.lbl.gov/als/safety/staff.html> . For additional information about the audit itself, go to the ISM 2009 Review Web page at <http://www.lbl.gov/ehs/ism/2009/index.shtml> . In particular, click on the "Information for Divisions" tab (http://www.lbl.gov/ehs/ism/2009/info_divisions.shtml) to see lists of likely questions ("McCallum-Turner Suggested Questions") and video clips ("Mock ISM Interview" and "Overview of Integrated Safety Management").

2. STRUCTURE OF THE EBOLA VIRUS GLYCOPROTEIN BOUND TO AN ANTIBODY FROM A HUMAN SURVIVOR

(Contact: Erica Ollmann Saphire, erica@scripps.edu)

Ebolavirus, one of two members of the family of filoviruses, causes a severe hemorrhagic fever with 50-90% human mortality. That no vaccines or treatments are yet available combined with the frequent re-emergence of the virus, its high prevalence among wildlife, and ease of importation of the virus make it a significant public health concern. A team of researchers from the Scripps Research Institute, using diffraction data collected at ALS Beamline 5.0.2, has recently determined the crystal structure of an oligomeric glycoprotein from the viral surface in complex with a rare antibody derived from a human survivor. This work explains how the glycoprotein, termed GP, mediates recognition of the host cell, drives fusion of the viral and host membranes (necessary for viral entry into the host), and masks itself from immune surveillance. The structure also explains why antibodies that neutralize the virus are so rare, identifies the very few sites to which a neutralizing antibody might bind, and thus, provides templates for vaccines and antibodies against the virus.

Read the full story at:

http://www-als.lbl.gov/als/science/sci_archive/175ebola.html

Publication about this research: J.E. Lee, M.L. Fusco, W.B. Oswald, A.J. Hessel, D.R. Burton, and E.O. Saphire, "Structure of the Ebola virus glycoprotein bound to an antibody from a human survivor," *Nature* 454, 177 (2008).

3. UEC CORNER: THE ELECTION RESULTS ARE IN!

by Hendrik Ohldag

(Contact: Hendrik Ohldag, hohldag@stanford.edu)

UEC Corner: The 2008 UEC election polls are closed. Congratulations to David Osborn (Combustion Research Facility, Sandia National Laboratories), Chris Jacobsen (Department of Physics and Astronomy, Stony Brook University), and Yayoi Takamura (Department of Chemical Engineering and Materials Science, UC Davis), whom you have elected to represent you on the UEC for the next three years, starting in January 2009. Please join me in sending

them a big, warm welcome! Becoming a member of the ALS UEC is an exciting opportunity to work for and advocate on behalf of your fellow colleagues and meet interesting people both within and outside the UEC. This moment is also an excellent opportunity to thank Elke Arenholz, Alessandra Lanzara, and Tony van Buuren, the three UEC members who are leaving the committee after their term expires at the end of 2008. Their contributions, ideas, and hard work have made a significant impact on the UEC over the past three years.

Since this is my last contribution to the ALS news as the chair of the UEC in 2008, I also would like to take this opportunity to thank all of you for your support and your ideas. I have had many conversations with ALS users over the past year regarding UEC issues, and I learned that many of you care deeply about the future of this wonderful facility. The ALS is truly much more than just an instrument that we use to obtain data to advance our careers. It is a place where we come to meet colleagues, discuss ideas, and try to solve scientific puzzles that have a big impact on the world we live in. It is the excitement about the work we do, the people we do it with, and the opportunities that we are given that make this place special. In this spirit, the ALS UEC will, with your help and support, continue to work for you and make sure that the ALS continues to be a lab that we all enjoy coming to. I therefore ask that you give the same support to Kenneth Goldberg, who will take over as UEC chair in 2009, that you gave me and the 2008 UEC.

Thank you all very much. This was an exciting year for me.

4. CALL FOR GENERAL USER PROPOSALS: DUE JANUARY 15, 2009

The User Services Office is accepting general user proposals from scientists who wish to conduct research in the general sciences at the ALS during the running period from July through December 2009. The deadline for submissions is Thursday, January 15, 2009. (This deadline does not apply to protein crystallography proposals, which have a separate process and schedule.) To submit a new proposal, go to the ALS online forms page (<http://alsusweb.lbl.gov/>) and choose to either begin a new proposal or edit an existing one.

The following resources are available for further information:

- * ALS User Services Administrator (alsuser@lbl.gov)
- * General user proposals
(<http://www.als.lbl.gov/als/quickguide/independinvest.html>)
- * Beamline and contact information
(http://www.als.lbl.gov/als/als_users_bl/bl_table.html)

5. BULLETIN BOARD

ALSNews holiday schedule

ALSNews will be taking the month of December off. We will return in the new year with our January 28, 2009, issue. Have a happy and safe holiday!

6. ALS-RELATED WEB NEWS AND LINKS

New insight into the controls on a go-to enzyme
<http://lightsources.org/cms/?pid=1003134>

Hearing Highlights Importance of Basic Research to New Energy Technologies
<http://www.aip.org/fyi/2008/104.html>

Mother of Pearl Secret Revealed
<http://newscenter.lbl.gov/press-releases/2008/11/25/mother-of-pearl-secret-revealed/>

7. OPERATIONS UPDATE

(Contact: Dave Richardson, DBRichardson@lbl.gov)

For the user runs from October 22 to November 16, the beam reliability (time delivered/time scheduled) was 93.2%. Of the scheduled beam, 86.7% was delivered to completion.

Questions about beam reliability should be sent to Dave Richardson. Requests for special operations use of the "scrubbing" shift should be sent to Rick Bloemhard (ALS-CR@lbl.gov, x4738).

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