

APS/Users Monthly Operations Meeting

B. Stephenson

November 28, 2012

Agenda

- APS Update – Brian Stephenson
 - Safety – Work Planning and Control Procedures
 - Science Highlights
 - Glenn Decker Named APS Fellow
 - Talk January 14 on Nobel Prize Work
 - Staffing and Space Planning
 - 1 Pacesetter Award
- APS Upgrade Update – George Srajer
- *In situ* X-ray Study of Materials in Nuclear Environments:
The Proposed XMAT Beamline – Meimei Li



Work Planning & Control

- APS will be issuing a procedure for documenting work planning and control
- Three general categories of work are described:
 - Work performed using Skill of the Worker/Researcher
 - Work performed using step-by-step procedures
 - Specific work not covered by either of the above
- All experiments will continue to be documented by ESAF
- Hazard analyses and hazard controls for non-experimental work will be documented using a new Argonne web-based process
- CAT safety plans will need minor revision to address this new procedure
- A generic document for beamline operations hazard analysis and hazard controls will be prepared and will include most beamline non-experimental work
- Beamline staff may need to prepare some documents to address specific beamline unique hazards, especially if work procedures for these do not exist
- We will organize a meeting with beamline local managers and safety coordinators in January to discuss this in more detail



Engineering Thin-Film Oxide Interfaces

Scientific Achievement

High-energy x-rays reveal electrical conductivity at the interface between two oxide insulators, help resolve the mysterious origin of conductivity in epitaxially-grown lanthanum aluminate (LaAlO_3) and strontium titanate (SrTiO_3) thin films

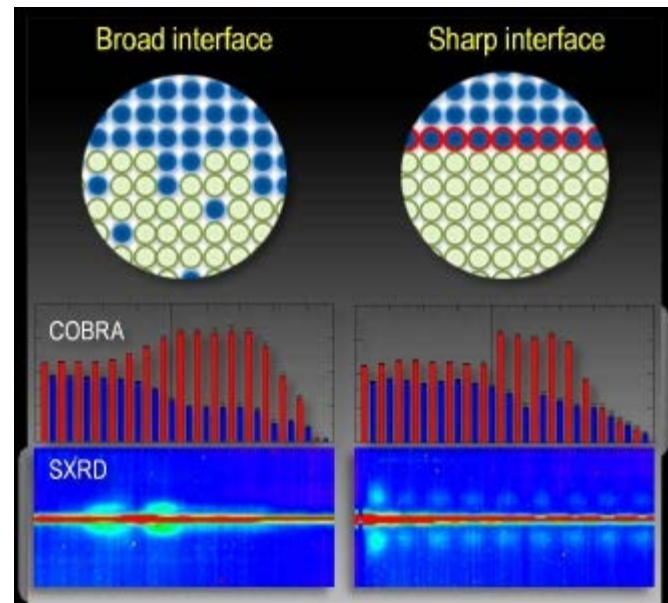
Significance and Impact

Provides new insights about a material that might form the basis for an alternative to conventional silicon-based semiconductor technology

Research Details

- Investigators systematically explored effects of high and low oxygen pressures on physical properties of thin-film LAO/STO systems produced using pulsed laser deposition
- Highly sensitive diffraction techniques enabled by extreme brightness synchrotron x-rays allowed study of the structure and composition of the LAO/STO near-interface region with unprecedented detail

W. S. Choi, C. M. Rouleau, S. S. A. Seo, Z. Luo, H. Zhou, T. T. Fister, J. A. Eastman, P. H. Fuoss, D. D. Fong, J. Z. Tischler, G. Eres, M. F. Chisholm, H. N. Lee, "Atomic Layer Engineering of Perovskite Oxides for Chemically Sharper Heterointerfaces," [Adv. Mater.](#), published online 4 October, 2012.



LAO thin films on STO substrates are depicted in the top schematics (LAO indicated by blue spheres, STO by green spheres). The top left-hand panel demonstrates a chemically broad interface resulting from conventional growth in a low pressure oxygen environment. The top right-hand panel shows a chemically abrupt interface produced by inserting a monolayer-thick buffer (blue spheres circled red) grown in high pressure with the rest of the thin-film structure grown at low pressure. The middle two panels indicate electron densities obtained by COBRA associated with the SrO and LaO layers (red bars), and the TiO and AlO_2 layers (blue bars): while the electron densities corresponding to a sharp interface (right panel) abruptly change at the boundary, the left middle panel indicates chemical mixing (the LAO/STO boundary is marked by a vertical line). The bottom two panels represent results from real-time surface x-ray diffraction during the growth of LAO films. The regularly spaced intensity oscillations of the diffuse scattering peaks in the right panel indicate a 2-D layer-by-layer growth, whereas in the left panel no pronounced 2-D growth and a delayed appearance of the first oscillation peak are observed when grown in low pressure due to chemical broadening of the interface.

33-ID, 12-ID

Contact hnlee@ornl.gov

Work was performed at Argonne National Laboratory



U.S. DEPARTMENT OF
ENERGY

Office of
Science



Argonne
NATIONAL LABORATORY

Outsmarting Flu Viruses

Scientific Achievement

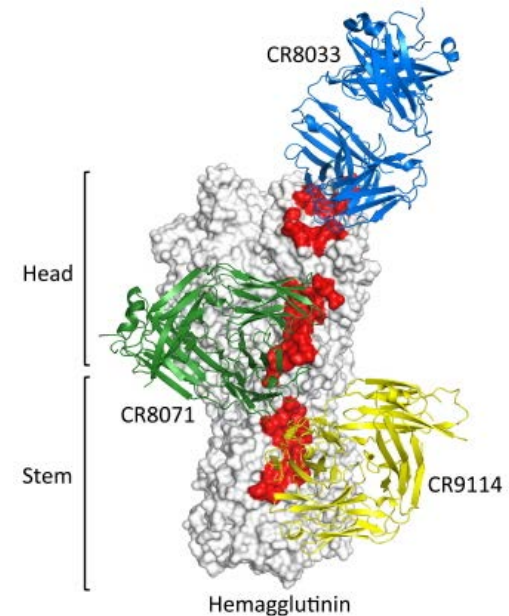
Utilizing synchrotron x-rays, several biological protein structures were solved to study the interaction of antibody CR9114 with group 2 influenza A viruses, allowing confirmation of the broad neutralizing activity of CR9114

Significance and Impact

Results pave the way for development of a universal vaccine for all influenza A and B viruses

Research Details

- Human monoclonal antibodies previously shown to neutralize wide variety of influenza A viruses; extending that work to include influenza B viruses critical because these flu strains cause a large proportion of annual flu infections, are major cause of seasonal epidemics every 2 to 4 years
- Researchers found three human monoclonal antibodies that protect against potentially lethal infection from two influenza B strains; two of the antibodies, CR8033 and CR8071, bind to conserved epitopes in the head region of the influenza B hemagglutinin (HA); the third antibody, CR9114, attaches to a conserved epitope in the HA stem, and, most important, provides protection against influenza A and B viruses



Surface representation of influenza hemagglutinin (white) with the newly identified sites of vulnerability colored red. Each site is unique and targeted by a different antibody. CR8033 (blue) binds to the head of HA, CR8071 (green) just below the head, while CR9114 (yellow) binds the stem. The stem binding CR9114, with its cross-neutralizing ability for influenza A and B viruses, provides proof of principle that a universal flu vaccine may be achievable.

C. Dreyfus et al., "Highly Conserved Protective Epitopes on Influenza B Viruses," [Science 337, 1343 \(14 September 2012\)](#).

Contact wilson@scripps.edu; jaap.goudsmit@crucell.com

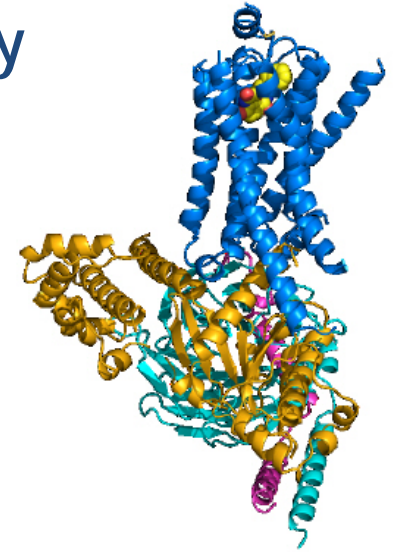
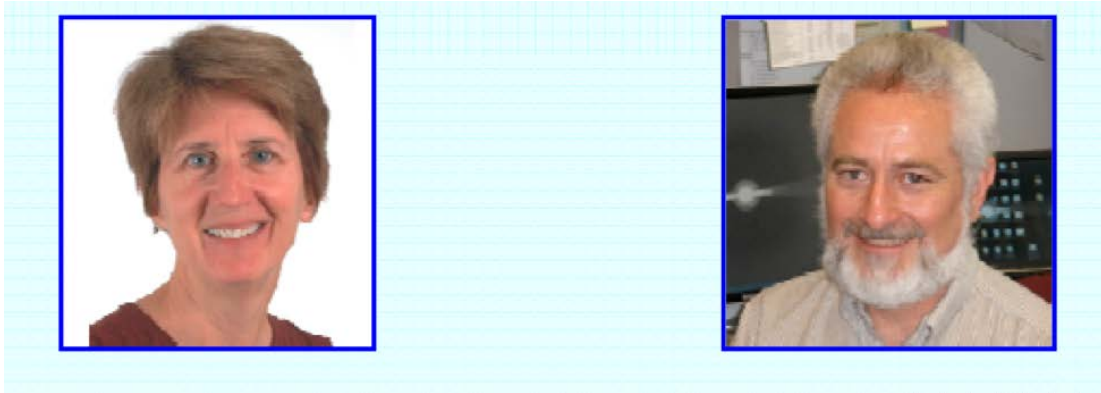
Work was performed at Argonne National Laboratory, Stanford University, Lawrence Berkeley National Laboratory

American Physical Society Honors Decker

- APS Senior Scientist Glenn Decker (ASD) has been named a fellow of the American Physical Society, an honor limited to no more than one-half of one percent of the society's membership of more than 50,000
- The fellowship recognizes his “outstanding contributions to the design, commissioning, and enhancement of synchrotron light sources, and for innovative developments in the field of particle beam diagnostics.”



Talk Describing 2012 Nobel Prize in Chemistry



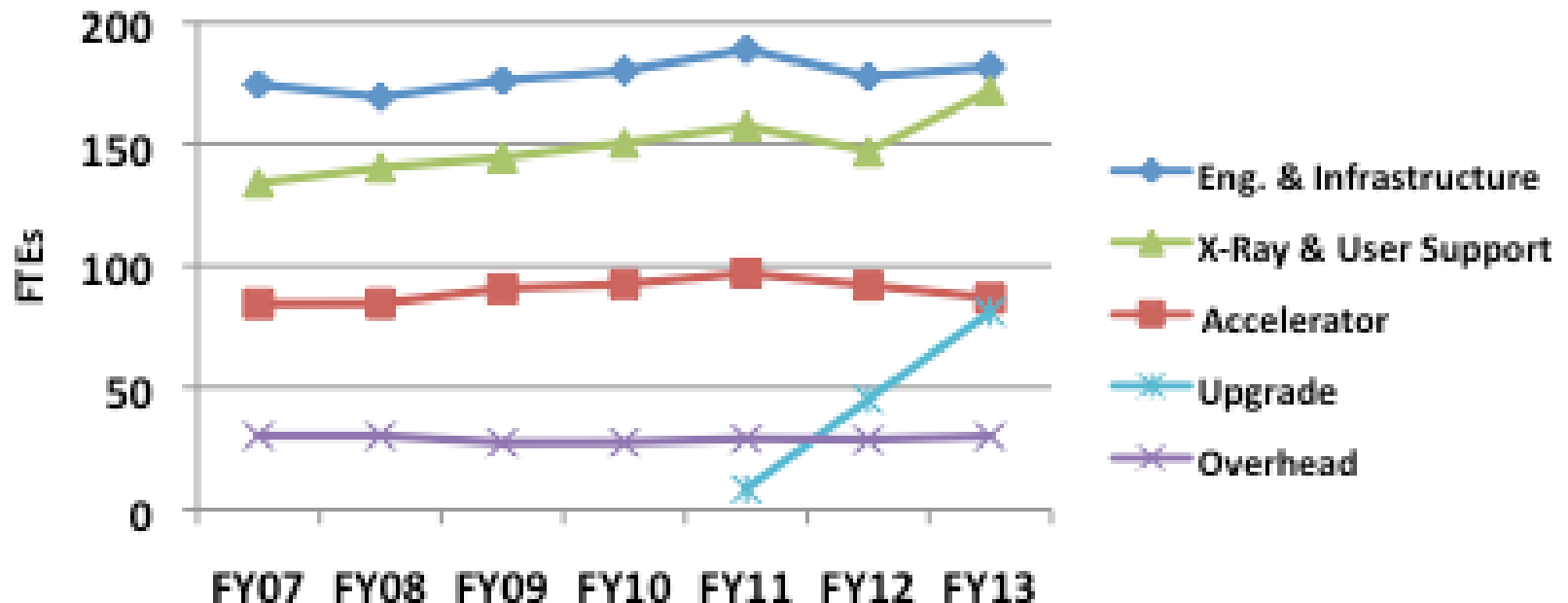
- Janet Smith (U. of Michigan) and Bob Fischetti (APS/XSD) will make a presentation on January 14 to describe the work carried out at the APS GM/CA beamlines that contributed to the 2012 Nobel Prize in Chemistry awarded to Brian Kobilka (Stanford U.) and Robert Lefkowitz (HHMI, Duke U.) for work on G-protein-coupled receptors.



APS Staffing Increases, Driven by the Upgrade

- FY12:
 - 46 staff hires
 - 6 postdoc hires
 - 14 contractors
 - (22 terminations)
- Plan for FY13:
 - 70 staff hires
 - 10 postdoc hires

APS Actual and Planned FTEs



Office Space in FY2013

- The plan calls for 80 new hires for FY2013 – where will we put them?
 - Selected areas of Building 401 can be reworked to make room for more people. The Divisions have just updated their seating charts and seating locations are being reviewed to guide upcoming rework decisions.
 - More people (and equipment) will be moved into Building 314. The new Building 400A is also being considered for possible office/cubicle additions.
 - Buildout of the offices in LOM 437 is planned for FY2013. When complete, LOM 437 will be able to house at least 40 people.
 - The Guest House can be used for temporary accommodation. It is economical and office spaces are available. APS has ~15 people there now. The Guest House can absorb another 60 people in office spaces if required, and can be used for temporary accommodation e.g. until LOM 437 is complete.



New Conference Rooms on 2nd and 3rd Floors

- Allows conversion of old 3rd floor conference room to office space



LOM 437 Typical Contents



Current Activity in Moving Equipment

- LOM 437 needs to be cleared of most or all contents by February 15, 2013 to allow build out work to proceed. The office spaces will be built in the pentagons; some lab buildout is an option if funds are available.
- Most of Sector 27 needs to be cleared by February 1, 2013 to allow enclosure construction preparations to begin for the first Upgrade beamline (RIXS).
- The destinations for these items are still being determined; space clearing work has begun in Building 382.
- This is an opportunity to dispose of unused items as dumpsters and riggers will be provided.
- Individual groups were not paying for space in 437 or 400; if kept and stored in other buildings, costs will be ~\$20.00/sq ft/yr.



Sector 35 Upstream Area

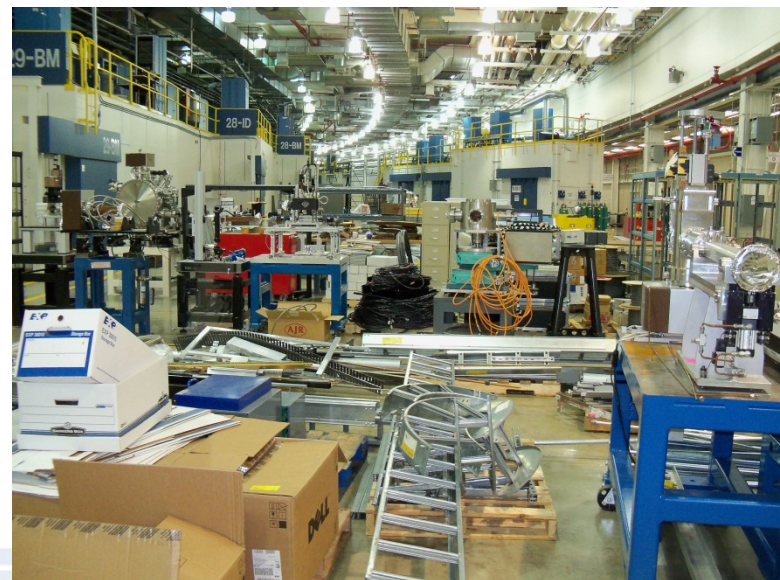


New MOM Technician Area

Previously the Exercise Room adjacent to the Lower Gallery
Provides space for techs now in Sector 35 area



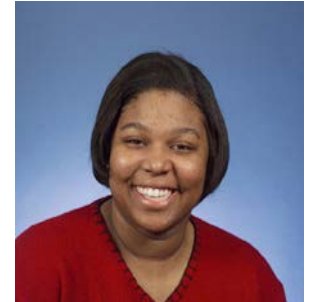
The Sector 27 and 28 Area



Pacesetter: Erika Benda, Michelle Givens, Oliver Schmidt, Joshua Downey, Tom Buffington, Ned Arnold, Steve Hanuska, Angela Ross, Tadas Budraitis, and Brian Rusthoven (AES)



Tom Buffington



Angela Ross

Front Row: Joshua Downey, Steve Hanuska, Oliver Schmidt, Erika Benda
Back Row: Ned Arnold, Michelle Givens, Brian Rusthoven, Tad Budraitis

Planning, organizing and performing the work required to achieve a smooth transition from the existing APS electronic drawing management system to PDMLink 10.1. Combined effort in the implementation of new hardware and software systems was flawless. This work provides APS one of the most current engineering drawing/document management tools available today.

