APS/Users Monthly Operations Meeting

G. Brian Stephenson

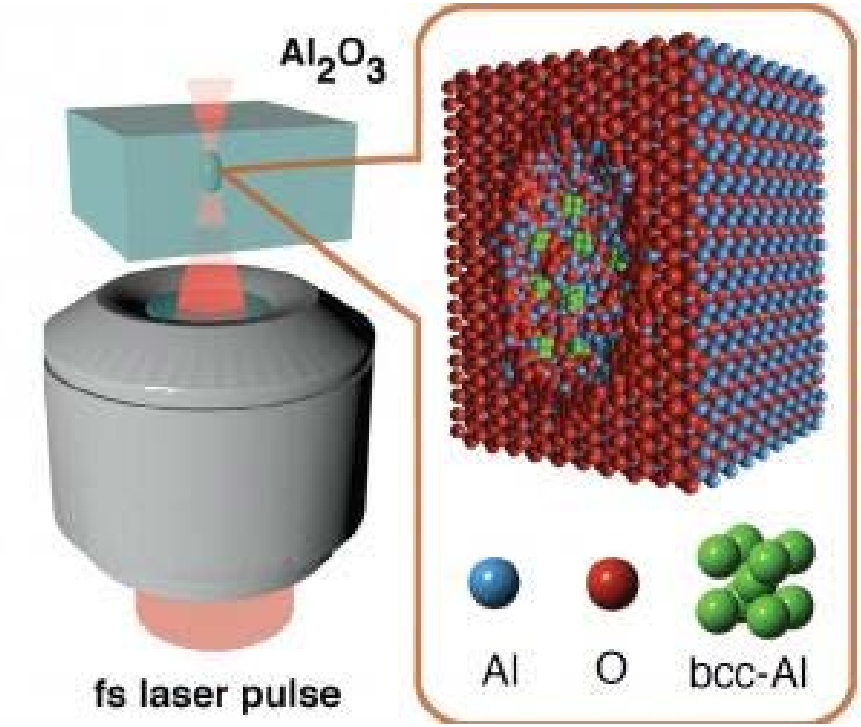
November 30, 2011

Agenda

- 2:30 p.m. Refreshments
- 2:45 p.m. APS Update – Brian Stephenson
- 3:05 p.m. Assessment of APS Work and Storage Spaces – Chuck Prokuski
- 3:25 p.m. IEX Electromagnetic Variable Polarizing Quasi-periodic Undulator – Mark Jaski
- 3:45 p.m. Adjourn

Creating the Heart of a Planet in the Heart of a Gem

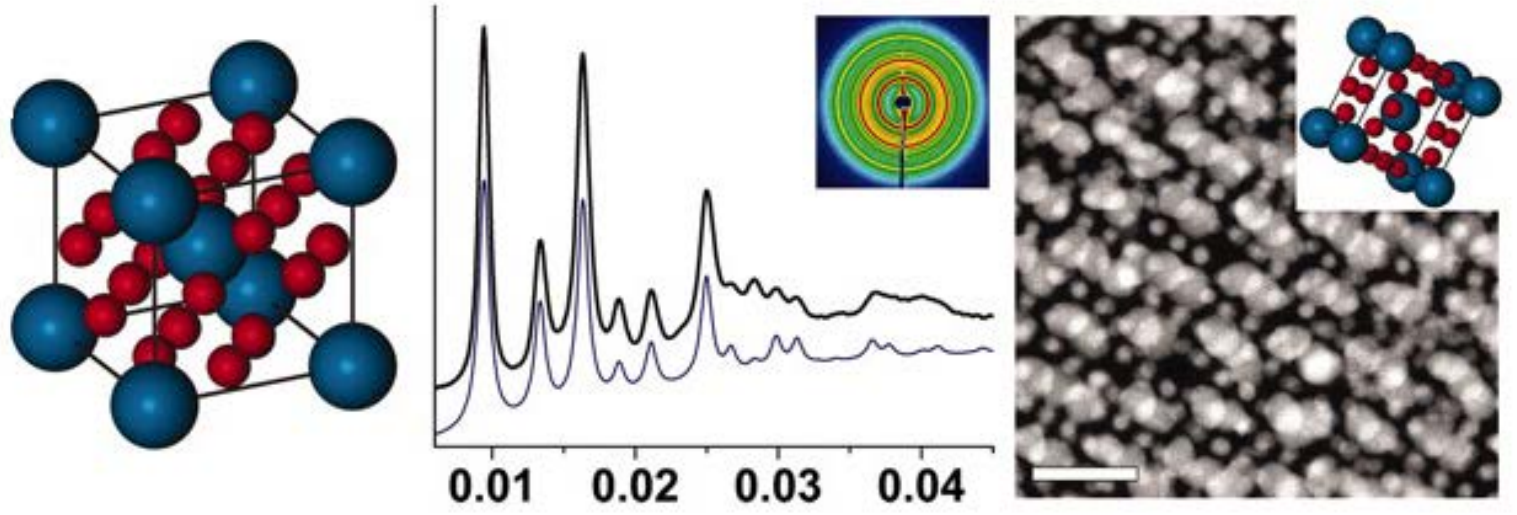
- Researchers at HP-CAT beamline 16-BM-D found a novel form of aluminum
- Table-top laser device at Shizuoka University (Japan) that penetrates crystals and sets off interior micro-explosions was used to blast tiny bits of sapphire creating powerful shock waves that compressed surrounding material
- Under extreme conditions—terapascals of pressure, temperatures of 100,000K—warm dense matter formed
- Because sapphire is an alumina, researchers expected to find evidence of various phases of high-pressure alumina inside gem
- Instead examination at HP-CAT of sapphire interior showed minuscule amounts of surprisingly stable, highly-compressed body-centered cubic elemental aluminum



Left: A tightly focused femtosecond pulse generates hot plasma in sapphire, which in turn produces a strong shock wave, which compresses the material against the surrounding pristine Al_2O_3 crystal into a densified amorphous phase A and forms a void V in the centre of a laser-induced microexplosion. The superdense bcc-Al phase was found within this compressed material. Right: A sapphire crystal with a laser-carved cavity. (Image by Arturas Vailionis.)

Arturas Vailionis et al., Nat. Commun. **2,** 445 (23 August 2011)

Emulating — and Surpassing — Nature

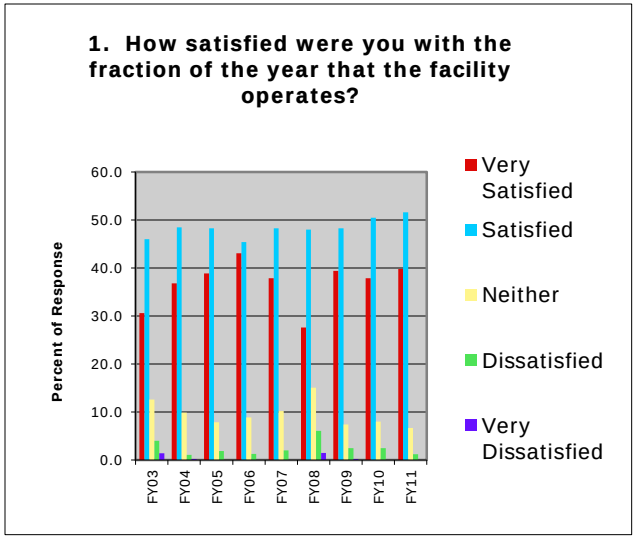


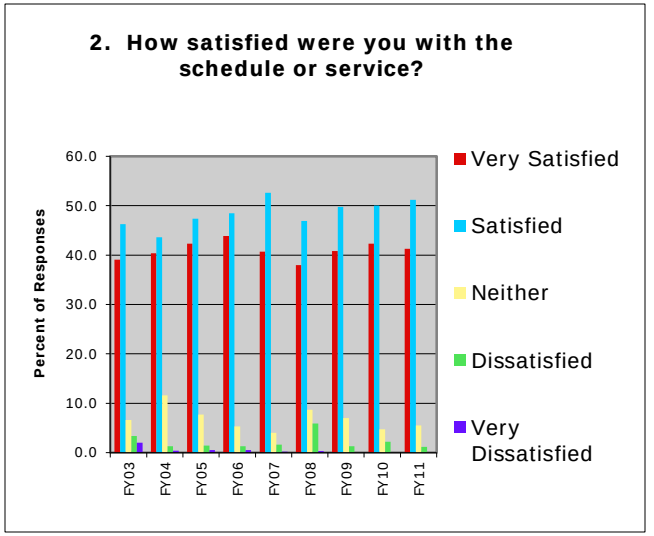
Example of an isostructural superlattice, Cs_6C_{60} lattices. L. to r.: model unit cell (not to scale); 1-D and 2-D (inset) SAXS diffraction patterns,; TEM image of resin-embedded superlattices, with the unit cell viewed along the appropriate projection axis (inset). (From Macfarlabne et al., Science **334**, 204 [2011]).

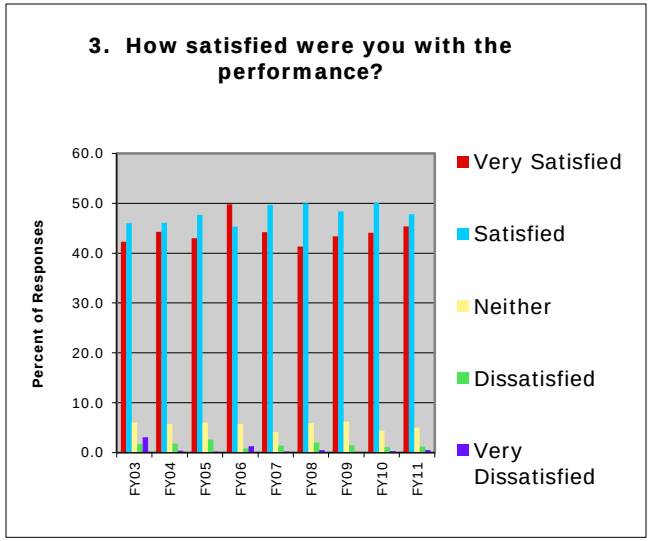
- Researchers using DND-CAT beamline 5-ID learned to build crystalline materials from nanoparticles and DNA, same material that defines genetic code for all living organisms
- Using nanoparticles as "atoms" and DNA as "bonds," they created crystals with particles arranged in same types of atomic lattice configurations as some found in nature
- Have also have built completely new structures that have no naturally occurring mineral counterpart
- Basic design rules established for this approach to nanoparticle assembly promise possibility of creating a variety of new materials that could be useful in catalysis, electronics, optics, biomedicine and energy generation, storage and conversion technologies

Robert J. Macfarlane et al., Science **334**, 204 (14 October 2011)

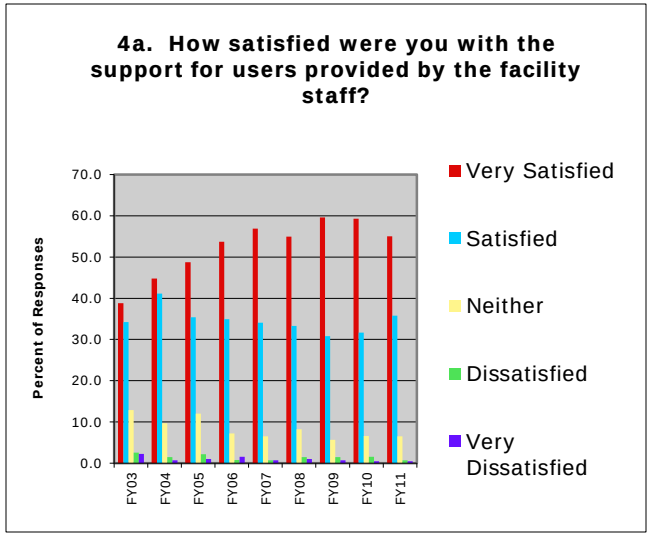
Response to DOE Questions on User Survey

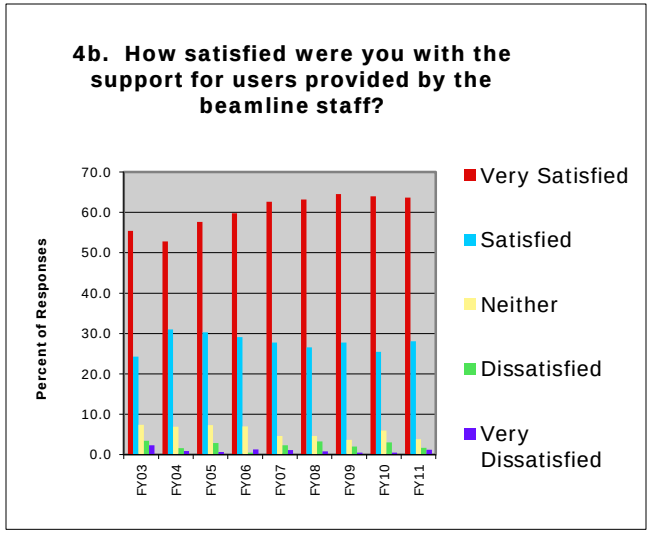






Response to DOE Questions on User Survey





Responses from the User Survey question: What would you like this facility to do differently?

- Improve/Change the General User proposal process
  - GUP-information (statistics) about … each beamline should be available
  - Easier and more straightforward access to industry users

- Improve Documentation/Training/Education
  - One thing that would help me and my students would be a workshop (in-person once per year, or on-line) to help novices learn how to process and interpret data gathered during our experiments

- Misc.
  - For time-sensitive experiments, it's unfortunate that most down/maintenance periods seem to be synchronized with other synchrotrons (e.g., NSLS) rather than distributed, so that there is year-round availability
  - I believe that trikes are dangerous
  - Improve the radioactive material review and safety procedures; they should be brought in line with actual risk

Budget and Staffing

- We are operating under a continuing resolution, expected to last to December 16
- After the CR, we expect funding for both operations and Upgrade preliminary design this year
- Have active searches underway for 64 personnel openings

"Educate the Director" Meetings

- Over the next year, I am meeting with a different APS group each week
  - Mainly educational for me, to meet people, understand what they do
  - Includes a tour of workplace

- Will extend to meetings with every CAT

Senior Advisor for Life Sciences at the APS

I am pleased to announce the appointment of Prof. Keith Moffat of the University of Chicago as Senior Advisor for Life Sciences at APS (SALSA), effective immediately. His duties will include:

- Advise APS management on the priorities, challenges, and future directions of the life sciences community at the APS
- Coordinate development of a strategy for life sciences facilities and policies at the APS in the context of the Upgrade that will foster and stimulate world-class achievements
- Interact with life science advisors and senior staff at other synchrotron facilities
- Work with groups within the life sciences community to advocate for funding

To Improve the Management of the Spaces We Occupy …

As is common at most labs, as the APS has matured, work and storage space is coming at more of a premium. The APS is working to better manage its spaces under its control:

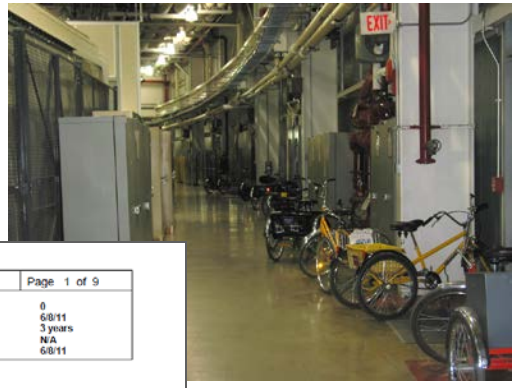
- Ensure space is used effectively;
- Maintain a professional, uncluttered appearance; and
- Maintain a safe work environment, that meets Argonne ESH standards.

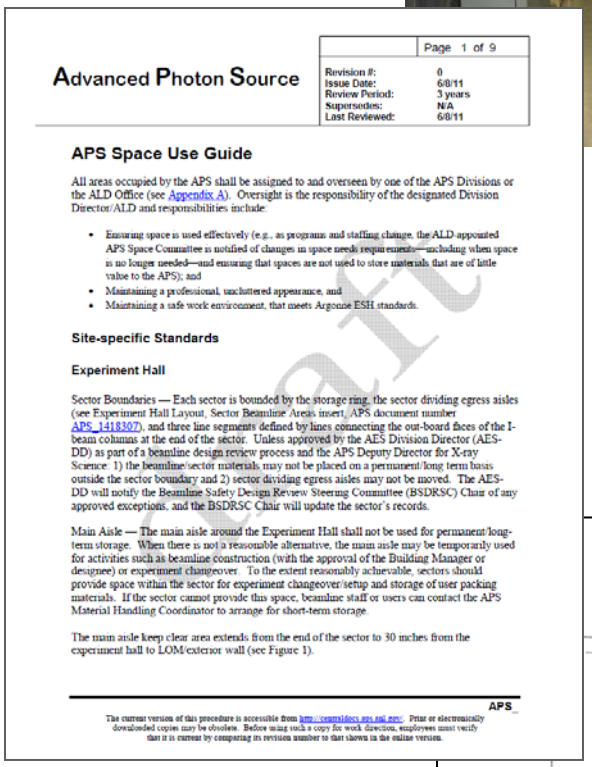
New Space Guide

With stakeholder input an APS Space Use Guide has been drafted. It addresses:

1. Who's responsible for APS spaces
2. Site-specific standards
3. Managing storage spaces

Thank you for your comments.





Advanced Photon Source

Page 1 of 9

Revision #: 0
Issue Date: 6/8/11
Review Period: 3 years
Supersedes: N/A
Last Reviewed: 6/8/11

APS Space Use Guide

All areas occupied by the APS shall be assigned to and overseen by one of the APS Divisions or the ALD Office (see Appendix A). Oversight is the responsibility of the designated Division Director/ALD and responsibilities include:

- Ensuring space is used effectively (e.g., as programs and staffing change, the ALD-appointed APS Space Committee is notified of changes in space needs requirements—including when space is no longer needed—and ensuring that spaces are not used to store materials that are of little value to the APS); and
- Maintaining a professional, uncluttered appearance, and
- Maintaining a safe work environment, that meets Argonne ESH standards.

Site-specific Standards

Experiment Hall

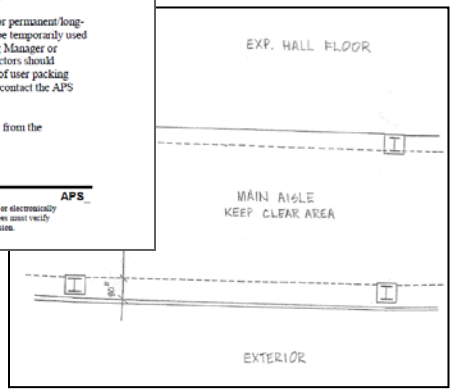
Sector Boundaries — Each sector is bounded by the storage ring, the sector dividing egress aisles (see Experiment Hall Layout, Sector Beamline Areas insert, APS document number APS_1418307), and three line segments defined by lines connecting the out-board faces of the I-beam columns at the end of the sector. Unless approved by the AES Division Director (AES-DD) as part of a beamline design review process and the APS Deputy Director for X-ray Science: 1) the beamline/sector materials may not be placed on a permanent/long term basis outside the sector boundary and 2) sector dividing egress aisles may not be moved. The AES-DD will notify the Beamline Safety Design Review Steering Committee (BSDRSC) Chair of any approved exceptions, and the BSDRSC Chair will update the sector's records.

Main Aisle — The main aisle around the Experiment Hall shall not be used for permanent/long-term storage. When there is not a reasonable alternative, the main aisle may be temporarily used for activities such as beamline construction (with the approval of the Building Manager or designee) or experiment changeover. To the extent reasonably achievable, sectors should provide space within the sector for experiment changeover/setup and storage of user packing materials. If the sector cannot provide this space, beamline staff or users can contact the APS Material Handling Coordinator to arrange for short-term storage.

The main aisle keep clear area extends from the end of the sector to 30 inches from the experiment hall to LOM/exterior wall (see Figure 1).

APS

The current version of this procedure is accessible from http://oraprddocs.aps.anl.gov/. Print or electronically downloaded copies may be obsolete. Before using such a copy for work direction, employees must verify that it is current by comparing its revision number to that shown in the online version.



APS Space Committee

As an advisory committee to APS management, the APS Space Committee will:

- Review space utilization in all APS facilities;
- Provide the point of contact for requests for new spaces; and
- Review requests for exceptions from APS space use guideline (e.g., conversion of common areas or aisle ways to dedicated office, storage, meeting, or work areas).
- Committee Chair: John Maclean

Storage

- Short-term storage will be provided to APS Users, including transient experimenters and CAT beamline personnel.
- Long-term storage, longer than ninety days, is available for APS Users and may be charged to the owner's User account.
- When there is not a reasonable alternative, with the approval of the Building Manager, the main aisle may be temporarily used for staging construction or experiment changeover. To the extent reasonably achievable, sectors should provide space within the sector for experiment changeover/setup and storage of user packing materials.
- The Building Manager will keep the main aisle clear.
- Requests for the long-term allocation of space in the around the exterior perimeter of the main aisle way are to be made to the APS Space Committee.