ALS - Advanced Light Source

The Advanced Light Source, perched in the Berkeley Hills, overlooks San Francisco Bay / Roy Kaltschmidt, Berkeley Lab

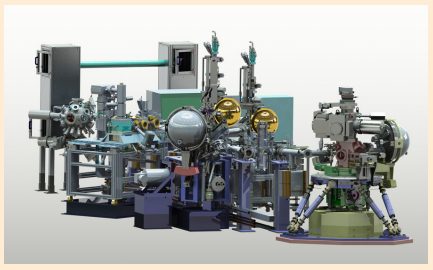
The Advanced Light Source, a Department of Energy national user facility, attracts scientists from around the world and supports its users in doing outstanding science in a safe environment.

Planned Development

Future plans 1 :

Controls and Accelerator: The replacement of the original low-level controls with a modern, distributed control system; a storage-ring radio frequency upgrade with the installation of two new klystrons; and a brightness upgrade with the installation of 48 sextupole magnets.

The first of two new klystrons is moved into place in January 2012; a second one will be installed in January 2013 / ALS Communications

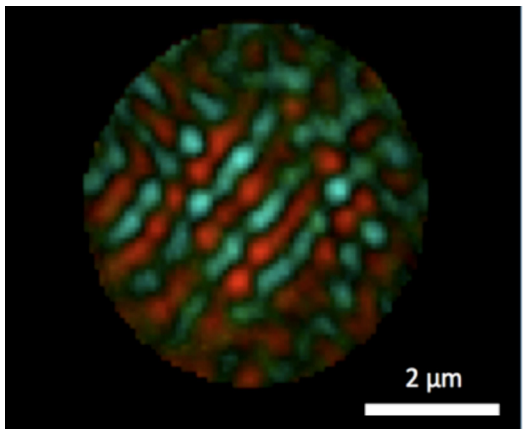


Rendering of planned endstations for MAESTRO. The beamline is slated for commissioning in 2013 / Eli Rotenberg, ALS

Future plans 2 :

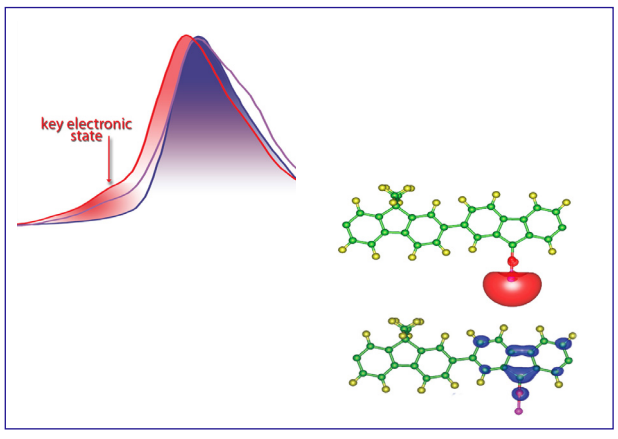
New Beamlines: MAESTRO, for nanoscale-resolution photoemission; COSMIC, featuring scattering (nanoscale organization of complex materials) and imaging (ptychography of magnetic nanostructures) branches; and AMBER, for in situ, in operando, energy research.

Highlights



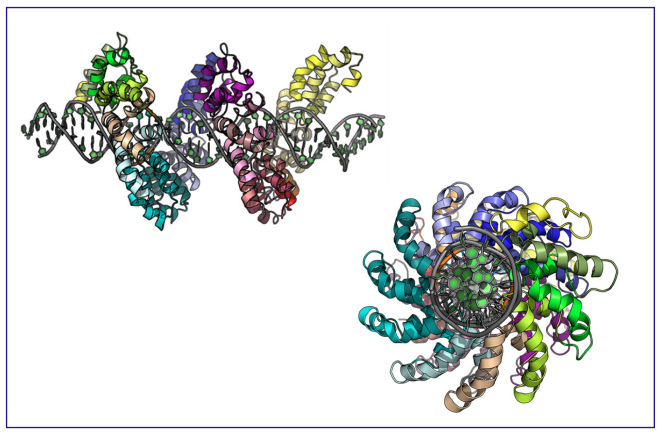
Magnetic domains (red and green) in a thin magnetic film of Co-Tb alloy; the colors represent electron spin direction / J.J. Turner et al., Phys. Rev. Lett. 107, 033904 (2011).

The high brightness and coherence of the ALS's soft x-rays have enabled scientists to apply lensless x-ray imaging for the first time to nanometer-scale magnetic structures in a cobalt–terbium alloy. Iterative algorithms using data from the cobalt L-edge revealed full magnetic-domain structure.



XAS spectra of a series of polymers (top); theoretical calculations reveal how Li ions attach / G. Liu et al., Advanced Materials 23, 4679 (2011).

Soft x-ray absorption spectroscopy at the ALS has revealed a new kind of anode material, a polymer suitable for use in lithium-ion batteries, that is eight times more absorbent than current materials and that maintains this greatly increased energy capacity after hundreds of charge-discharge cycles.



The structure of the TAL effector PthXo1 bound to its target DNA sequence (side and top-down views shown) / A.N.-S. Mak et al., Science 335, 716 (2012).

In genome engineering, a single position within a DNA sequence is altered without affecting the rest of the genetic code. The structure of a new gene-targeting system solved at the ALS, the TAL effector nuclease, reveals its mechanism of action and provides crucial details for future development.

In a Nutshell

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ALS Advenced Light Sources
Deborah A. Smith
www-als.lbl.gov

Starting year 1993

Management
Roger Falcone, Division Director
Steve Kevan, Deputy Division Director for Science
Michael Banda, Deputy Division Director for Operations

User Office
Elizabeth Moxon

Enquiries on major procurement projects
http://procurement.lbl.gov/

Electron-energy : 1.9 GeV
Nominal-beam-current : 500 mA
X-Ray-energy-range : IR-46 keV
37 beamlines

Key figures (2011)

5300 hours of operation
1931 users of which 175 remote users
600 refereered publications