Australian Synchrotron
Turning bright ideas into brilliant outcomes

Australian Synchrotron

Australia's newest user research facility, the Australian Synchrotron is a highly intense source of light ranging from infrared to hard x-rays used for a wide variety of research purposes.

What is a synchrotron?

A synchrotron light source is a machine that accelerates charged particles such as electrons to extremely high energies – creating an electron beam that travels at almost the speed of light. When high-energy electrons are forced to travel in a circular orbit, they release extremely intense radiation – synchrotron light.

Synchrotron light has many useful properties and can be filtered and directed down 'beamlines' for use in a wide range of non-destructive, high-resolution, rapid, in-situ, real-time imaging and analysis techniques. The Australian Synchrotron is an advanced third- generation 3GeV light source with a high quality, low emittance, stable electron beam that generates synchrotron light of high brilliance.

The unique properties of synchrotron light mean that experimental results are far superior in accuracy, clarity, specificity and timeliness to those obtained using conventional laboratory equipment. Synchrotron techniques can generate images and provide elemental, structural and chemical information from diverse sample types ranging from biological to industrial materials.

How the Australian Synchrotron can help you achieve your research objectives

Access is by peer-reviewed application and is free if you publish your results in the open literature. Our services are also available on a confidential basis to fee-paying clients. Beamtime applications are invited three times a year.

To find out more about how the Australian Synchrotron can help you achieve your research objectives faster, visit www.synchrotron.org.au or call +61 3 8540 4100.

Techniques available at the Australian Synchrotron

Beamline	Techniques	Capabilities
Imaging and medical therapy	Phase contrast enhanced high energy x-ray imaging	Very flexible beamline for research into high contrast imaging of objects from small animals through to engineering components. For research into the physics and biophysics of cancer therapy techniques.
Infrared spectroscopy (including high spectral resolution far-IR)	Fourier Transform infrared spectroscopy and infrared microspectroscopy	Analysis of bond structures in complex molecules, biological materials, minerals and band structures in certain semi-conductors.
Microspectroscopy (x-ray fluorescence microprobe)	X-ray absorption and emission spectroscopy at a submicron scale	For producing high-resolution maps of elemental distribution in a sample with very low detection limits (µg/g). Also for determining the oxidation state and coordination geometry of atoms in samples, down to 100nm size.
Powder diffraction	Medium to high energy powder x-ray diffraction	Versatile high resolution powder diffraction facility equipped with sample holders for a wide range of in-situ experiments.
Protein crystallography, high-throughput	Medium energy, multiple wavelength anomalous dispersion x-ray diffraction	Dedicated facility for crystallography of protein crystals, set up with robotic loading and centring, and for remote operation.
Protein microcrystal and small molecule diffraction	Medium energy, multiple wavelength anomalous dispersion x-ray diffraction	Facility with finely focussed x-ray beam for determining the crystal structure and electron density maps of small, hard–to-crystallise proteins, nucleic acids and for small molecules.
Small angle and wide angle x-ray scattering	Medium energy small angle x-ray scattering/wide angle x-ray scattering	Measurement of atomic and nano-scale structure in complex molecules and materials.
Soft x-ray spectroscopy	Low energy x-ray absorption and emission spectroscopy	Measurement of short and medium range order, bond lengths, coordination numbers and local coordination geometry, and the oxidation state of atoms for the light elements, Z<20. Also for the analysis of surfaces and thin films.
X-ray absorption spectroscopy	Medium and high energy x-ray absorption and emission spectroscopy	As for soft x-ray spectroscopy, from atomic number Z=20 upwards.

Contact info

Section **User Office**
Phone **+61 3 8540 4100**
Email **user.office@synchrotron.org.au**
Web **synchrotron.org.au**

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