



Developing our understanding of materials - NCESS



The National Centre for Electron Spectroscopy and Surface Analysis (NCESS) brings together researchers, academics and industry to address problems in materials science, surface science and engineering.

Situated at STFC's Daresbury Laboratory and funded by the Engineering and Physical Sciences Research Council (EPSRC), this mid-range facility is used by the UK physics, chemistry and materials communities as a dedicated high performance x-ray photoelectron spectroscopy (XPS) facility.

Mid-range facilities are often too big for universities to afford themselves, are provided for open use by all UK universities, and are significantly smaller than the central large-scale facilities operated by STFC (such as the Diamond Light Source or ISIS).

NCESS provides 160 days of supported machine time per year with experienced researchers using additional facility time out of hours.

XPS is a surface-sensitive chemical analysis technique that involves shining a beam of x-rays onto a sample. Some of the X-ray energy is transferred to electrons at or close to the surface and this allows them to escape from the material.

Measuring the number of photoelectrons (the released electrons) and their energy distribution provides information about the types of atom present (the chemical composition) and the way they are bonded to neighbouring atoms or groups of atoms (chemical and electronic state). If the electrons in materials are more tightly bound then a higher energy X-ray source is required.

NCESS works collaboratively with UK universities and industry on programmes set up for targeted research areas. These range from studies of polymers and composites through to ceramics, semiconductors, metals, nanostructures and novel materials.

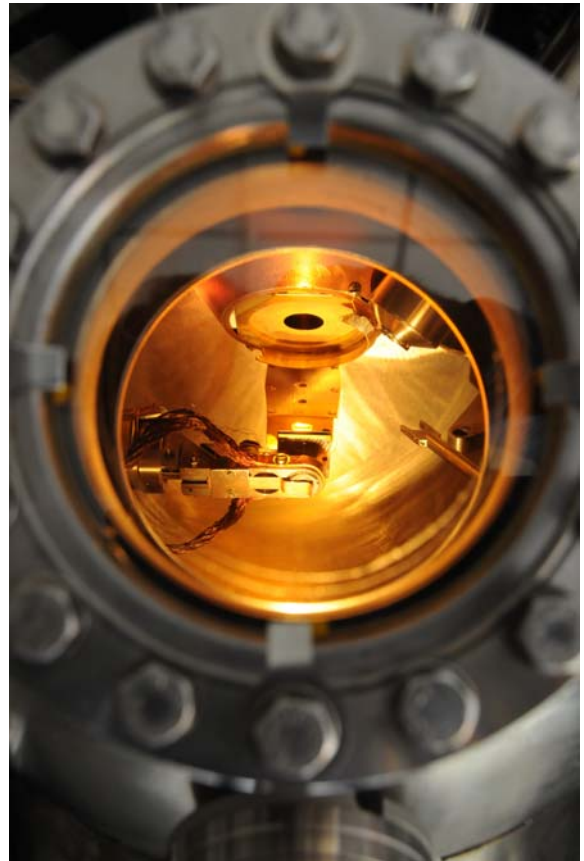
The XPS technique at NCESS has helped develop and further our understanding of a wide variety of materials. Research is also helping to address challenges in new areas including healthcare and clean energy production and storage.

In healthcare, NCESS is supporting researchers in the development of biomaterials and biocompatible surfaces. Their research could enable breakthroughs in cell growth, protein binding, dental and medical implants as well as biosensors with switchable surfaces that tell the body's systems what to do.

The Science and Technology Facilities Council

In energy, NCESS research is analysing the surface of materials for batteries, fuel cells and hydrogen storage and developing materials for solar hydrogen production. This will help ensure cleaner, affordable and secure energy sources for future generations.

It shares users with two other mid-range facilities at Daresbury Laboratory – the Medium Energy Ion Scattering facility (MEIS) and SuperSTEM (an aberration-corrected electron microscope). The scientific cross-over between them is strong creating a hub for the science research into the atomic-scale characterisation of materials.



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