CATALYSIS

Industrial research using Diamond

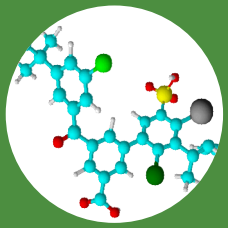
The eternal dream to explore matter at its deepest level has continually driven scientists to build more and more powerful instruments from simple microscopes to elaborate X-ray sources.

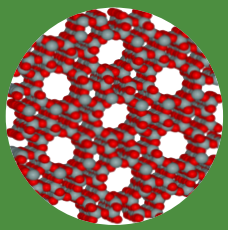
Diamond Light Source is a sophisticated synchrotron light facility which can generate highly intense beams of light ranging from IR and UV to X-rays, all of which are making research at the cutting edge of modern science possible. Diamond provides specialist analytical techniques for the atomic to microscale characterisation of materials as diverse as novel pharmaceuticals, catalytic materials, coatings, motor oils, and large engineering components.

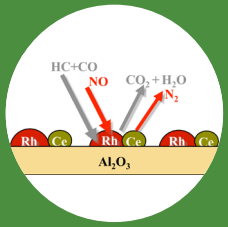
Our dedicated Industrial Liaison Team of highly skilled scientists is available to support you in every step of your research. The team can help to translate your R&D challenges into meaningful analytical solutions by making use of its diverse expertise in synchrotron methods.

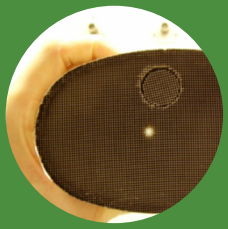
Some examples of how Diamond can be used for catalysis research are outlined overleaf.

diamond.ac.uk/industry









Applications

Homogeneous catalyst design

- Structural characterisation of homogenous catalysts for the fine chemical and pharmaceutical industries;
- Optimising catalyst design based on its selectivity and activity towards a specific reaction e.g. alkylation, oligomerisation, carbon-carbon coupling reactions;
- Studies of electronic and structural ligand-active metal interactions.

Heterogeneous catalyst design

- Investigations on three-way catalysts – monitoring the effect of a promoter on an active metal and overall performance of a catalyst;
- Studies of novel, more efficient Fischer Tropsch catalysts, promoted with various dopants;
- Structural characterisation of multifunctional mesoporous materials e.g. zeolites, AlPO-types with different active metals.

Mechanism of catalytic reactions

- Structural and electronic studies of catalyst and catalytic processes under *in situ*, time-resolved reactor conditions to mimic real industrial processes;
- Mechanistic *in situ* studies of fast kinetic phenomena.and detection of multiple transition species of catalyst under operation;

Processing of catalytic materials

- Follow structural changes during processing under service conditions;
- Understand processes of poisoning and deactivation of catalysts under extreme conditions e.g. high temperature, pressure;
- Detect strain, fatigue, pores and cracks within catalytic systems under operating conditions.

SF-CAT-003-2

For further information

Diamond Industrial Liaison Team

+44 1235 778797
industry@diamond.ac.uk
diamond.ac.uk/industry
@DiamondILO