

THE UNIVERSITY OF MANCHESTER
PARTICULARS OF APPOINTMENT
FACULTY OF SCIENCE & ENGINEERING
SCHOOL OF ENGINEERING
DEPARTMENT OF CHEMICAL ENGINEERING
RESEARCH ASSOCIATE IN CATALYSIS
VACANCY REF: SAE-031147

Salary: £37,174 - £45,413 per annum depending on experience
Hours: Full time (1 FTE)
Duration: Fixed term for 36 months
Location: Oxford Road, Manchester

Enquiries about the vacancy, shortlisting and interviews:

Name: Prof. Chris Hardacre; Prof. Sofia Diaz-Moreno

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Background

This Postdoctoral Research Associate (PDRA) position is part of the [UK Catalysis Hub](#) funded by EPSRC. New catalytic processes are critical for the achievement of NetZero on the required timescales, but delivering on this challenge needs an understanding of chemically active sites and of reaction intermediates. Observation of the latter is challenging in many systems as the concentration of spectator species are in a large excess compared with the analyte/active site of interest. Modulation-excitation and multivariate methods allow intermediate species/active sites to be more easily observed, but have only been applied in specific model circumstances. This project will develop and compare these methods for application in X-ray absorption and emission spectroscopies (XAS and XES, respectively) for gas phase catalytic reactions. In particular, these techniques will be exemplified initially for the conversion of CH₄/CO₂ to hydrocarbons and NH₃ production.

Overall Purpose of the Job

This PDRA role will investigate the thermal and non-thermal plasma (NTP) activation of a range of catalysts for reactions under study and use them to develop methodologies to probe the reaction mechanisms. As well as using synchrotron-based techniques, *in situ* infrared spectroscopy will be applied to examine surface reactions. The PDRA will work closely with other researchers in the UK

Catalysis Hub, particularly those requiring experiments in synchrotron radiation and those applying neutron and laser techniques at the ISIS neutron and muon source and the central laser facility in Harwell.

Key Responsibilities, Accountabilities or Duties

The range of duties will include:

- Conduct individual and collaborative research projects according to the overall needs of the research program.
- Develop research objectives and proposals for own or joint research, with the assistance of a mentor if required.
- Write up research work for publication.
- Continually update knowledge and understanding in field or specialism.
- Translate knowledge of advances in the subject area into research activity.
- Deal with routine communication using a range of media.
- Communicate complex information, orally, in writing and electronically.
- Liaise with colleagues and students.
- Work with colleagues on joint projects, as required
- Collaborate with academic colleagues on areas of shared research interest.
- Attend and contribute to relevant project meetings.
- Use new research techniques and methods.
- Use creativity to analyse and interpret research data and draw conclusions on the outcomes.
- Contribute to collaborative decision making with colleagues in areas of research.
- Use research resources, laboratories and workshops as appropriate.
- Plan and manage own research activity in collaboration with others.
- Balance with help the competing pressures of research and administrative demands and deadlines.
- Be aware of the risks in the work environment and their potential impact on their own work and that of others.
- Post holders are required to familiarise themselves with the University's Equality and Diversity policies and to actively support these wherever possible.

PERSON SPECIFICATION

Essential Knowledge, Skills and Experience:

- A PhD in heterogeneous catalysis or related subject
- A degree in chemistry, materials, chemical engineering, or similar, with practical laboratory experience or extensive work experience in a similar role.
- Experience of X-ray absorption and/or X-ray emission spectroscopy.
- Experience of gas phase catalysis and/or characterising the catalytic materials.
- Excellent communication and interpersonal skills.
- Excellent time management and organisational skills.
- Ability to work independently and as part of a team.
- Ability to liaise confidently and effectively with a range of individuals.
- Flexible approach to dealing with research problems as they arise.
- Willingness to learn and develop.
- Ability to present in both written and oral publications.
- Ability to meet deadlines.

- Strong record of journal publications appropriate to stage of career.
- The ability to evaluate complex data.
- Ability to assess and organise resources.
- Contribution to the supervision and support of PhD students.
- A flexible approach to working with the willingness to travel and work outside normal business hours (if occasionally required).

Desirable Knowledge, Skills and Experience:

- Experience of gas phase *in situ* surface infrared spectroscopic measurements of heterogeneously catalysed processes.
- Experience of synthesis of heterogeneous catalysts.
- Experience of working with industrial and academic partners.