

Research Opportunities at the School of Chemistry

Our School has four core research themes:

- Sustainable Synthesis and Catalysis
- Chemical Biology
- Materials and Interfaces
- Analytical Chemistry

Take a look through the work of the different research groups within each theme. If you are interested in applying for a PhD position, then contact the PI for help with your application!

Sustainable Synthesis and Catalysis

Catalytic Upgrading of Biorenewables

[Prof. Steve Bull](#) – sdb45@leicester.ac.uk

- Catalytic transformations
- Biocatalysis
- Flow chemistry
- Biorenewable feedstocks

Synthetic and Catalytic Applications of Earth Abundant Metals

[Dr. Fabrizio Ortu](#) – Fabrizio.ortu@leicester.ac.uk

- Earth abundant elements in synthesis and catalysis
- Small molecule activation for sustainable synthesis
- f-Block chemistry and molecular magnetism

Novel Synthetic Methodology

[Dr. Alex Pulis](#) – a.pulis@leicester.ac.uk

Single Atom Catalysts for Fine Chemical Synthesis

[Dr. Qun Cao](#) – qc52@leicester.ac.uk

- *Development of Novel Material Synthetic Strategies:* Explore innovative approaches for the synthesis of transition metal-based heterogeneous catalysts.
- *Creation of Electro/Photocatalytic Cross-Coupling Strategies:* Develop entirely new electrochemical and photocatalytic methods for C-C and C-N bond cross-coupling as proof-of-concept demonstrations, application to pharmaceutical synthesis (training e.g., GC, GC-MS, NMR, XRD).
- *Advanced Characterization and Mechanistic Studies:* Characterize heterogeneous catalysts and conduct mechanistic investigations using advanced characterization techniques such as STEM, SEM, XPS, operando XAS, and synchrotron-based Mössbauer spectroscopy.

Bioinspired Catalytic Small Molecule Activation

[Dr. Sandy Kilpatrick](#) – sandy.kilpatrick@leicester.ac.uk

Novel Methodology for Fluorination of Organic Small Molecules

[Dr. Alison Stuart](#) – alison.stuart@leicester.ac.uk

- Developing novel synthetic methodology for the fluorination of organic molecules
- Performing mechanistic studies to understand and control our reactions
- Designing new hypervalent iodine reagents
- Investigating new strategies for enantioselective fluorination

Value-added Products via Smart Catalyst Design

[Dr. Greg Solan](#) – gas8@leicester.ac.uk

- Next generation catalysts based on earth abundant transition metals
- Unlock the potential of functional ligands to enhance catalyst performance
- Apply methodology to industry-specific targets
- Address key sustainable challenges (*e.g.*, convert CO₂ to biofuels)

Chemical Biology

Natural and Artificial Metalloenzymes for Energy Conversion

[Dr. Patricia Rodriguez-Macia](#) – prm28@leicester.ac.uk

- Mechanistic investigation of natural metalloenzymes for energy conversion, i.e. hydrogenases (H₂ oxidation and production) and CO dehydrogenases (reversible CO₂-to-CO conversion), via a combination of spectroscopic, electrochemical, computational and structural methods
- Mechanistically-driven design of novel artificial metalloenzymes for green chemistry (i.e., H₂ production, CO₂ reduction and oxidation reactions) based on natural protein scaffolds
- Bioinspired *de novo* designed protein as scaffolds for novel artificial metalloenzymes for green chemistry

Metallopharmaceuticals

[Dr. Rama Suntharalingam](#) – k.suntharalingam@leicester.ac.uk

- The development of metal-based anti-cancer stem cell agents
- Polymeric nanoparticles for drug delivery
- Probing cell death pathways in cancer cells
- Anti-osteosarcoma small molecules with immunogenic potential

Heterobifunctional Molecules and Chemical Probes

[Dr. James Hodgkinson](mailto:jthodgkinson@leicester.ac.uk) – jthodgkinson@leicester.ac.uk

- The synthesis and biological evaluation of proteolysis targeting chimeras (PROTACs) for the targeted degradation of individual HDAC corepressor complexes
- The synthesis of novel proximity-inducing heterobifunctional molecules and their mechanism of action studies
- The synthesis and biological evaluation of novel Antibody-Drug Conjugates (ADCs)

The Chemical Biology of Formaldehyde

[Dr. Richard Hopkinson](mailto:richard.hopkinson@leicester.ac.uk) – richard.hopkinson@leicester.ac.uk

Molecular Glues and Cooperativity in Drug Development

[Dr. Richard Doveston](mailto:r.g.doveston@leicester.ac.uk) – r.g.doveston@leicester.ac.uk

- Molecular glues for 14-3-3 protein-protein interactions
- Dual ligand cooperativity for targeting Pin1 in cancer
- Fragment based development of inhibitors for PYCR1 in cancer
- Covalent protein modification strategies

Fluorescent Chemical Probes

[Prof. Steve Bull](mailto:sdb45@leicester.ac.uk) – sdb45@leicester.ac.uk

- Fluorescent probes
- Antibody-drug conjugates
- Cell imaging
- Antimicrobials
- Cancer drugs

Ultrafast Spectroscopy and Mechanism of Metalloenzymes and Materials for Energy Conversion

[Dr. Phil Ash](#) – philip.ash@leicester.ac.uk

Frontier Technologies in Spectroscopy, Imaging, Photonics and Microfluidics for Solving Problems at the Life Science Interface

[Prof. Andrew Hudson](#) – ah242@leicester.ac.uk

Materials and Interfaces

Electrochemistry for Real-World Applications and Environmental Monitoring

[Dr. Jake Yang](#) – my216@leicester.ac.uk

Electrochemical Deposition and Dissolution Processes; Surface and Interfacial Structure

[Prof. Karl Ryder](#) – ksr7@leicester.ac.uk

Interfacial Analysis and Imaging

[Prof. Rob Hillman](#) – arh7@leicester.ac.uk

- Electroactive polymer, metal and metal oxide films
- Physical characterisation (spectroscopic, acoustic, X-ray, neutron) of electroactive films
- Interfacial design for sensing and energy storage
- Latent fingerprint visualisation in forensic science applications

Analytical Chemistry

Molecularly Imprinted Polymers for Biosensing and Theranostics

[Prof. Sergey Piletsky](#) – sp523@leicester.ac.uk

Nanotechnology and Spectroscopy based on Superfluid Helium

[Dr. Shengfu Yang](#) – sfy1@leicester.ac.uk

Laser Spectroscopy and Mass Spectrometry of Molecules, Ions and Clusters in Helium Nanodroplets

[Prof. Andrew Ellis](#) – andrew.ellis@leicester.ac.uk

- Exploring superfluid and supersolid effects in helium-tagged molecular ions
- Using molecule-molecule clusters and complexes using laser spectroscopy in helium nanodroplets to investigate intermolecular forces
- Using helium nanodroplets to develop spectroscopic signatures of molecules and molecular ions in space
- Understanding ion-molecule chemistry relevant to astrochemistry using helium droplets and mass spectrometry

Atmospheric Chemistry, Earth Observation Science and Medical Diagnostics

[Prof. Paul Monks](#) – p.s.monks@leicester.ac.uk

Novel Functional Materials and Nanomaterials

[Dr. Elena Piletska](#) – ep219@leicester.ac.uk