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Catalysis and Reaction Engineering

Catalysis and chemical reaction engineering lie at the core of many chemical and biochemical processes. Research activities cover the fundamental catalyst design, through formulation and catalyst manufacture, to operational issues and reactor design.

The group aims to optimize reactor type, design and operating conditions to get the best performance and product selectivity in a particular reaction. Projects in the group, led by Dr Joe Wood, currently include:

- C-Cycle CO2 Capture, Activation and Utilisation (EPSRC). In collaboration with 7 Universities, adsorbents and catalysts are being developed to harness CO2 from power stations and convert it in to useful chemicals and fuels.
- Functional bionanomaterials and novel processing for targeted catalytic applications (EPSRC). In collaboration with Biosciences, a novel method is being used to support Pd nanoparticles upon bacteria. Catalytic testing is being carried out using a set of carefully selected reactions, including hydrogenation of 2-butyne-1,4-diol and 2-pentyne.
- Heterogeneous Catalysis in Supercritical Fluids: The Enhancement of Catalytic Stability to Coking (EPSRC). Reactions such as the isomerization of hexene and hydrogenation of naphthalene are being carried out in order to examine whether catalyst lifetime can be extended under supercritical conditions.
- In-Situ Catalytic Upgrading Of Heavy Crude And Bitumen: Optimisation Of Novel Capri Reactor (EPSRC). A process is being tested to catalytically upgrade oil in-situ within the producer well.
- **Read more about the group (/research/activity/chemical-engineering/energy-chemical/catalysis-reaction/chemical-reaction-group.aspx)** .

Dr Mark Simmons (/staff/profiles/chemical-engineering/simmons-mark.aspx) is also working on a number of problems of relevance to catalysis, in particular studying the impact of fluid dynamics upon catalytic and chemical processes. He currently holds a Royal Society Industrial Fellowship with Johnson Matthey. Projects include:

- Studies of downward bubbly flow in microchannels using particle image velocimetry (EPSRC).
- Development of novel capillary and high throughput reactors for carrying out enantioselective and biochemical synthesis (EPSRC).
- Studies of flow pattern and mixing in high throughput reactors (Johnson Matthey).
- Experimental and theoretical studies of liquid jet break up and curtain coating, in collaboration with Prof. Steve Decent in the Department of Mathematics (EPSRC).

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