Novel materials for automotive applications

A master’s thesis project is available at the Competence Centre of Catalysis (KCK) at the Applied Surface Chemistry division in cooperation with industrial partners Volvo Car Corporation and Haldor Topsøe.

Background
Passive selective catalytic reduction is a newly emerging technique for NOx abatement in passenger vehicles. It aims to produce NH3 in situ, utilising NOx and hydrogen-containing molecules present in the exhaust during rich operation (low O2). This NH3 will then be used as a reductant for NOx during lean operation (high O2). Since this is a new, emerging field in emissions control, a bottom-up approach to understanding how to formulate suitable NH3 formation catalysts is necessary.

Project objectives
The project aims to study the preparation of core-shell catalysts. A range of core-shell structured samples will be prepared to investigate the effect of catalyst formulation and/or preparation technique. The materials will be assessed for their performance as passive-SCR catalytic materials. Student input on the design and techniques used within this project will be greatly encouraged.

Learning objectives
- Literature overview of core-shell preparation methods
- Synthesis and characterisation of a series of novel catalysts
- Characterisation of materials before and after catalytic assessment
- Evaluation of the catalyst in a flow reactor for a selected model reaction
- In-situ characterisation of interesting reactions.
- Oral and written presentation of the project.

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