

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 NO_x abatement in passenger vehicles. It aims to produce NH₃ in situ, utilising NO_x and hydrogen-containing molecules present in the exhaust during rich operation (low O₂). This NH₃ will then be used as a reductant for NO_x 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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