Master project

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Effect of zeolite framework type on the combustion of CH_4 on supported Pd nanoparticles

Natural gas engines emit CH_4, which has 11 times higher global warming potential than CO_2. The currently used Pd/Al_2O_3 methane oxidation catalysts have relatively high light-off temperature and perform poorly during cold start.

Zeolite supported Pd catalysts provide lower light-off temperature and significant hydrocarbon storage capacity, allowing to capture emissions during cold start. However, their stability after exposure to high temperature and steam remains an issue.

The aim of this project is to examine the activity of palladium nanoparticles deposited on zeolites of various framework types, but with fixed parameters such as Si/Al ratio, synthesis technique, nanoparticle size and framework cation(s).

Zeolite-based catalysts will be prepared by ion exchange and characterized using a variety of methods including catalytic testing for methane combustion in a plug flow quartz reactor.

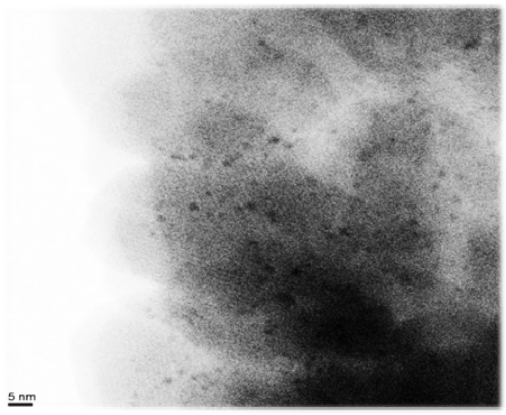

Fig. 1. TEM image of Pd supported on ZSM-5

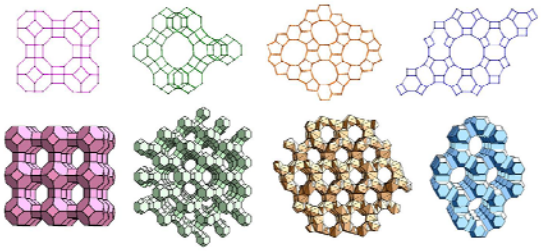

Fig. 2. Zeolite framework diversity

Tasks

- Synthesis of Pd-zeolite samples and characterization (XRD, BET, FTIR)
- Catalytic tests

Benefits

- Training in the use of catalytic reactor set up and standard characterization techniques
- How to write scientific reports and to present results on conferences/workshops
- Work in an international team

Application: exhaust catalysis

Type of work: Master

Nature of work: experimental

Requirements: interests in materials science, characterization methods, catalysis

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