

Master project

Bioenergy and Catalysis Laboratory, Paul Scherrer Institut, 5232 Villigen

Influence of washcoating procedure on the performance of a V-based SCR catalyst

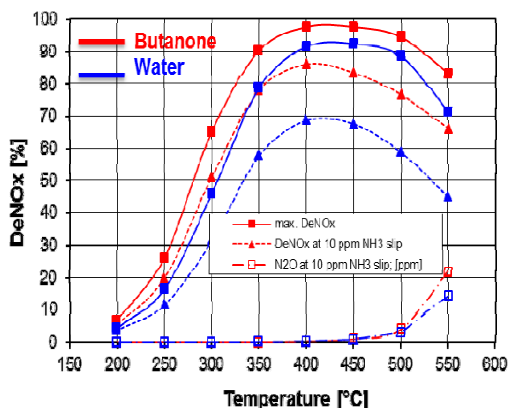
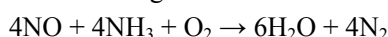


Fig. 1: DeNOx of a 2.2V/W/T-SCR cat.

The selective catalytic reduction (SCR) of NO_x by NH₃ is up to date the world-wide most efficient post treatment method for reducing nitrogen oxides emissions. The greenhouse gases NO_x are reacting with injected ammonia to form nitrogen and water according to the reaction:



An SCR catalyst consists of a support material such as TiO₂, promoters like WO₃ and SiO₂ as well as the active species, typically based on V₂O₅ or CeO₂. In order to develop high temperature stable catalysts, new synthesis routes and alternative active phases are needed. The procedure of synthesizing a catalytic material with its various composition as well as washcoating a monolith for testing its performance is a complex task with many parameters to consider.

The aim of the project is to look at the influence of the washcoating protocol on the activity of standard V-based catalyst. In preliminary tests, the absence of water in the washcoating step resulted in a performance enhancement as presented in Figure 1.

Therefore, V-based catalysts will be prepared, washcoated and characterized using the in-house DeNOx activity measurement and selectivity set-up. Additional information will be obtained from BET, XRD and DRIFTS which will allow obtaining a correlation between structural properties and the catalytic activity as a function of the parameter changed in the synthesis procedure.

Tasks

- Catalyst synthesis and washcoating on cordierite monoliths
- Characterization using XRD, BET and infrared spectroscopy
- Catalytic activity measurement of washcoated catalysts

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

Type of work: Master

Application: automotive catalysis

Nature of work: experimental

Requirements: interests in chemistry, materials science, lab-work, characterization methods, catalysis

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