Contribution ID: **48** Type: **Poster contribution**

Catalytic decomposition of guanidinium formate as novel ammonia precursor for selective catalytic reduction of NOx

Thursday, 5 July 2012 10:30 (1h 30m)

Selective catalytic reduction (SCR) of nitrogen oxides (NOx) with ammonia (NH3) is a common method in emission control. Mobile SCR systems inject aqueous urea solution (AdBlue®) into the hot exhaust gas to catalytically decompose it to NH3.
However, AdBlue® shows poor temperature stability in cold or hot climates. In contrast, Guanidinium formate (GuFo) solutions can be stored between -30 and 60℃, and contain 1.5x the amount of NH3.
GuFo needs a hydrolysis catalyst to yield NH3, commercial TiO2-anatase coated on cordierite support enabled complete conversion from 300℃. However, formic acid is a side product, it can further react to methanamide and HCN. The decomposition was elucidated by the combination of experiments with FTIR spectroscopy of reaction products and DFT calculations.
A catalyst screening determined Au-doped TiO2-anatase (Au/TiO2) to be an excellent catalyst for the simultaneous decomposition of formic acid and the release of NH3 stored in GuFo. Thus, complete decomposition of GuFo to NH3 and CO2 could be achieved from 250℃, without the formation of side products.
The Au/TiO2 catalyst was also investigated regarding its stability upon hydrothermal aging at temperatures around 750℃ or sulfur-poisoning using SO2, both procedures barely affected the catalyst's performance. These promising results were already transferred to an industrial company for commercialization, but the catalytic activity is still to be understood by advanced spectroscopic techniques

Primary author: Mr PEITZ, Daniel (Paul Scherrer Institut)

Co-authors: Mr ELSENER, Martin (Paul Scherrer Institut); Dr KRÖCHER, Oliver (Paul Scherrer Institut)

Presenter: Mr PEITZ, Daniel (Paul Scherrer Institut)

Session Classification: Poster Session

Track Classification: Catalysis