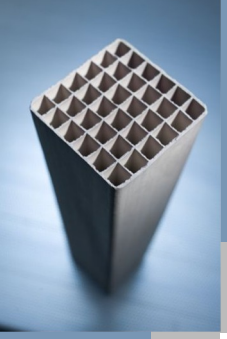

Project Newsletter No. 3

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Universität Stuttgart - EnBW Kraftwerke AG - E.ON New Build & Technology GmbH - ENEL Ingegneria e Ricerca S.p.A - IBIDEN Porzellanfabrik Frauenthal GmbH - RECOM Services GmbH

Headlines

- Over 30 different catalyst samples produced
- Screening of catalysts in laboratory micro reactor almost completed
- Technical scale mercury oxidation measurements performed
- Novel regeneration technology applied at full-scale monoliths
- First catalyst samples from full-scale test modules taken
- Effects of newly developed catalysts on laboratory wet FGD-systems researched
- Algorithms of catalysts lifetime behaviour integrated into 3D-CFD model
- Mercury oxidation round robin test started
- 4 publications in journals and at conferences performed

Publications

"9th Mercury emissions from coal", May 2012, St. Petersburg, Russia
Title
"*SCR-DeNOx catalyst development towards high-performance catalysts related to different fuel types*"

Short abstract:
The presentation describes the research approach and the methods of the project consortium. This includes a description of the applied mercury measurement methods, ranging from the low cost mercury sampling method for on-site measurements up to high-tech and high performance continuous mercury monitors used for detailed analysis of mercury behaviour in laboratory SCR-DeNOx-reactors and wet flue gas desulphurisation.

"9th European Conference on Coal Research and its Applications ECCRIA9", September 2012, Nottingham, United Kingdom
Title
"Influence of geometrical parameters of SCR-DeNOx-catalysts on DeNOx-activity, mercury oxidation and SO_2/SO_3-conversion"

Short abstract:
The publication describes the effect of different pitch size on the reactions proceeding at the catalysts. Therefore, laboratory as well as bench reactor tests have been carried out. DeNOx-activity, mercury oxidation and SO_2/SO_3-conversion were determined at catalysts with different geometrical size.

VDI Fachtagung Emissionsminderung, June 2012, Nürnberg, Germany
Title
"*Quecksilberoxidation in Kraftwerksrauchgasen mittels Katalysatoren*" - "Mercury oxidation in flue gases with catalysts"

Short abstract:
The application of SCR-DeNOx-catalysts can be considered as state of the art for efficient NO_x-reduction at power plants. Various studies showed, that the installed SCR-catalysts also facilitate the oxidation of elemental mercury (Hg^0) in the flue gas and thus the mercury retention in wet flue gas desulphurisation or in adsorption methods. An overview on the reaction of mercury oxidation at SCR-DeNOx catalysts is provided.

International Journal for Electricity and Heat Generation: VGB Powertech, 10/2012

Title
"Industrial scale assessment of the predictive quality of a 3D-CFD model for SCR DeNOx catalysts"

Short abstract:
A model for the mathematical description of the physical and chemical processes proceeding at SCR-DeNOx-catalysts is described. The model is included in the proprietary 3D-CFD-boiler simulation model "RECOM-AIOLOS". The newly developed model requires one calibration point per catalyst material at defined test conditions.

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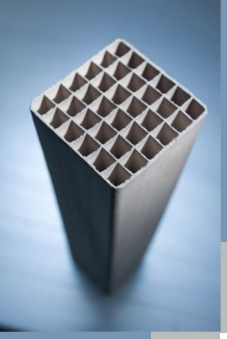

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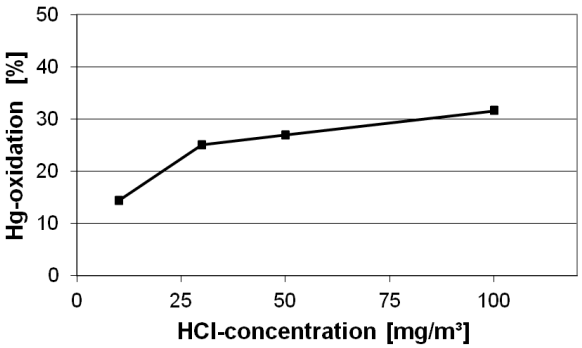
Mercury oxidation round robin test started

The background

There is a VGB guideline available for determination of DeNOx-activity and SO_2/SO_3-conversion in micro reactor and bench reactor: the VGB-R 302 He. However, there is no guideline for mercury oxidation tests. The project consortium agreed on test conditions for catalyst screening within the project. Based on the experience through these tests, all partners, which are operating micro reactors for mercury oxidation measurements started to perform a round robin test for mercury oxidation at catalysts.



Mercury oxidation at SCR-DeNOx-catalysts

The research and results of this round robin test will be summarised and a draft for an amendment to the VGB guideline, related to reliable determination of mercury oxidation at SCR-DeNOx catalysts, will be available in autumn 2013.

As can be seen in the figure on the left side, mercury oxidation at SCR-DeNOx catalysts is directly related to the flue gas HCl-concentration. Depending on the catalyst, mercury oxidation increases significantly up to a flue gas HCl-concentration of 50 mg/m³, with a steep increase between 0-30 mg/m³.

Equipment applied (2)

In the second newsletter, the micro reactor for catalyst tests within the DEVCAT project was presented. Extending, the size of the reactor, the bench reactor will be presented in this issue:

The technical scale bench reactor

At the so called “bench reactor”, the characteristic properties of fresh as well as deactivated and regenerated catalyst samples can be measured. Therefore, full scale samples in their original dimension are placed in the reactor and evaluated under a given set of operating conditions. Flue gas is generated by burning natural gas or propane. This flue gas is conditioned by cooling and heating and the addition of flue gas components like SO_2 and NH_3 upstream of the catalyst.

At the bench reactor, DeNOx-activity and SO_2/SO_3-conversion are determined. However, mercury oxidation tests cannot be performed there due to safety reasons. Compared to the micro reactor, the bench-reactor simulates full scale conditions more appropriately, yielding in more accurate values, which can be transferred to the full scale SCR-reactor. Additionally, realistic values of the pressure drop over full scale catalysts can also be gained in bench reactor tests. All partners operating bench reactors agreed on test conditions within the project.

Technical scale bench reactor operated at E.ON New Build & Technology, IBIDEN Porzellanfabrik Frauenthal GmbH and EnBW Kraftwerke AG, up to three full scale catalyst modules can be installed

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