Geophysical Research Abstracts
Vol. 15, EGU2013-5955-1, 2013
EGU General Assembly 2013

Direct CO_2-Methanation of flue gas

Klaus Müller, Michael Fleige, Fabian Rachow, Johannes Israel, and Dieter Schmeißer
Applied Physics, Brandenburgische Technische Universität Cottbus, Germany (muellerk@tu-cottbus.de)

Already discovered by Paul Sabatier in 1902 the Hydrogenation according to CO_2 + 4H2 ->CH4 + $2H_2O$ nowadays is discussed in the course of the "Power-to-Gas" approach to utilize excess energy from renewable electricity generation in times of oversupply of electricity. We investigate the behavior of this process in a simulated flue gas atmosphere of conventional base load power plants, which could be used as constant sources of the reactant CO_2.
In relation to an approach related to carbon capture and cycling, the conversion of CO_2 directly from the flue gas of a conventional power plant is a new aspect and has several advantages: The conversion of CO_2 into methane could be integrated directly into the combustion process. Even older power plants could be upgraded and used as a possible source for CO_2, in the same sense as the amine cleaning of flue gas, as a post combustion process. Further, waste heat of the power plant could be used as process energy for the catalytic reaction.
Therefore the influence of different flue gas compositions such as varying contents of nitrogen and residual oxygen are tested in a laboratory scale. The heterogeneous catalysis process is investigated with regard to conversion rates, yield and selectivity and long-term stability of the Ni-catalyst. Also the influence of typical contaminations like SO_2 is investigated and will be presented.