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Process for Methanol Formation from Flue Gas (CO_2)

This invention introduces novel catalysts that allow cost-effective production of methanol from CO_2. The presented modified MoS_2-based, low-cost catalysts are tolerant to sulfur and optimised towards methanol formation.

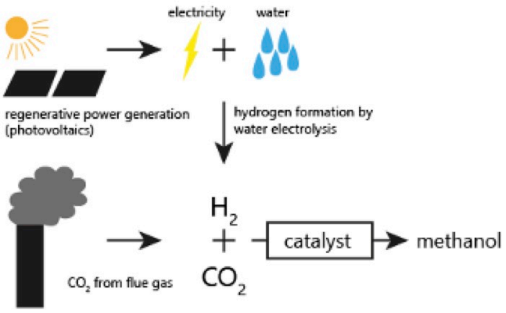
With more than 20 million tons produced annually, methanol is a highly relevant precursor in the petrochemical and chemical industries, and is typically produced from syngas (CO, carbon monoxide). Methanol synthesis from CO_2 (carbon dioxide) on an industrial scale would be desirable and beneficial, but costs were an inhibiting factor until now.

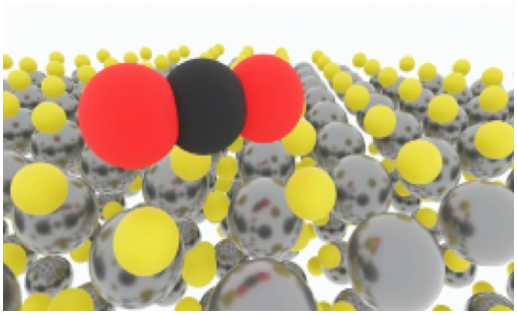
BACKGROUND

Catalysts need to be specifically matched to different feedstocks and requirements for the desired product. Commercially used catalysts for the hydrogenation of flue gas (e.g. $Cu/ZnO/Al_2O_3$) are highly sensitive to sulfur contaminations. Common flue gas contains traces of SO_2 which could deactivate these catalysts. Hence, time- and cost-intensive purification of the feed gas is required.

Currently, there is only one large-scale plant in the world that produces methanol from CO_2. Experts consider the development of a sulphur-tolerant catalyst to be of great interest. Such a catalyst would be particularly useful for major CO_2 generators (e.g. in the energy and industrial sectors) whose CO_2 contains sulphur.

The subject of this invention is aimed at the production of methanol from carbon dioxide (CO_2). The modified MoS_2-based catalysts are low-cost, tolerant to sulfur contamination in the feed gas, and are optimised by addition of promoters to optimise the synthesis route.





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The novelty lies in the manganese-promoted MoS_2 catalysts that show improved activity and selectivity for the formation of alcohols such as methanol. This means that by adding manganese to the MoS_2 catalyst, the production of methanol can be increased and the formation of unwanted by-products (e.g. methane) can be reduced.

The desired products can therefore be produced more selectively from CO_2 and hydrogen, and catalysts modified in this way also show improved activity compared to previously used MoS_2 catalysts.

ADVANTAGES

- Tolerant to sulfur contamination in feed gas
- Improvement of economically desired methanol formation
- Cheap catalyst material available on a large scale

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REFERENCE:
M018/2020

APPLICATIONS:

Methanol synthesis from CO_2

DEVELOPMENT STATUS:

Proof of concept

KEYWORDS:

- Methanol synthesis
- CO_2 hydrogenation
- CO_2 utilisation
- Heterogeneous catalysis
- MoS_2 catalyst

IPR:

Austrian patent filed

OPTIONS:

- R&D collaboration
- License agreement
- Sale

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