# TECHNOLOGY OFFER

## 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.

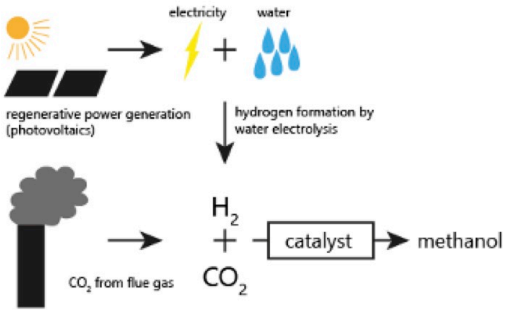
With more than 20 million tons produced annually, methanol is a highly relevant precursor in the petrochemical and chemical industries, and is typically produced from syngas (CO, carbon monoxide). Methanol synthesis from $CO_2$ (carbon dioxide) on an industrial scale would be desirable and beneficial,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

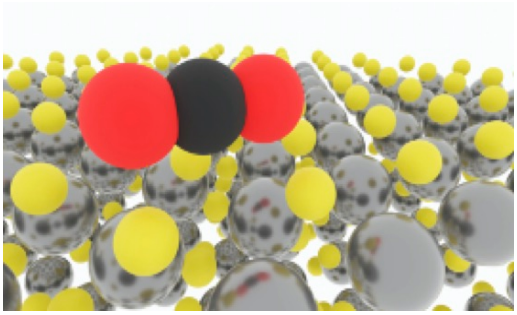
### BACKGROUND

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.



### TECHNOLOGY

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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