TECHNOLOGY OFFER

Reduction of CO_2 Using Metal Oxides

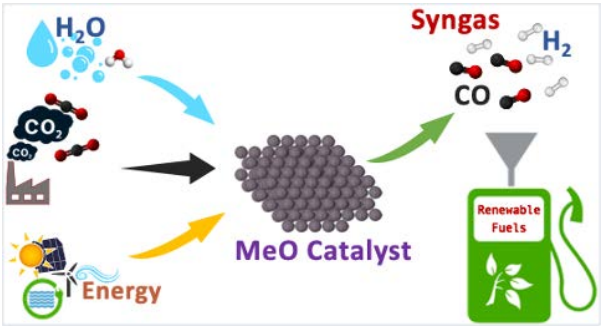
Efficient reduction of CO_2 is of utmost importance for improving the management of greenhouse-gas emissions, but it is also of significant relevance for many technological processes utilising CO.
In this novel, catalytic process CO_2 is reduced to CO using a specially treated transition metal oxide in the presence of water vapour. Depending on combinations with other gases (e.g. reduction of CO_2 in the presence of H_2), this provides an attractive, energy efficient way to produce e.g. synthesis gas, a mixture of H_2 and CO, which is extensively used in the chemical industry.

BACKGROUND

By chemically reducing CO_2 appropriately, it can be used as CO in industrial processes, thus transforming it from a greenhouse culprit to an attractive source, e.g. for synthesis gas. Synthesis gas is a crucial intermediate resource for the production of hydrogen, ammonia, methanol, synthetic hydrocarbon fuels, and also essential in numerous petrochemical processes.

To date, on an industrial level, CO is usually obtained by oxidation of hydrocarbons or elemental carbon. Therefore, an efficient and cost effective way to reduce CO_2 resulting in high-grade CO would be highly desirable for environmentally benign CO production.

The proposed process uses low cost, abundant materials, operates in a broad temperature window and is also tolerant towards elevated CO_2 pressure, or impurities. The metal oxides used in the operation can be regenerated in parallel, enabling a real catalytic process.



TECHNOLOGY

In the novel process CO_2 is reduced to CO by reaction with a specially treated transition metal oxide in the presence of water vapour. This can now be achieved at much lower temperatures than previously assumed. At the presence of moisture, CO_2 reacts with MnO and CoO to form CO and oxidise the metal oxide.

The inventive reaction of MnO and CoO with CO_2 to form CO was not known until now.

BENEFITS

- Non-precious, earth-abundant metals
- Low temperatures
- High turnover numbers
- Tested long-term stability
- Low material costs
- High tolerance towards impurities

APPLICATIONS

- Environmentally benign CO production (eg. for synthesis gas poduction)
- Industrial syntheses
- Refineries, petrochemical processes
- Environmental technology
- Further research

WISSENS/ TRANSFER/ OST/

www.wtz-ost.at

REFERENCE:
2019-006

DEVELOPMENT STATUS:
Prototype development, TRL 4

KEYWORDS:
- CO_2 reduction
- Transition metal oxides
- Carbon monoxide formation
- Non-precious metals
- Syngas, oxogas
- Catalytic process

IPR:
Austrian patent and PCT filed

OPTIONS:
- R&D collaboration
- License agreement
- Sale

INVENTORS:
- Dr. Danny Müller
- Dr. Christian Knoll
- DI Georg Gravogl
- Dr. Ronald Miletich
- Dr. Peter Weinberger

CONTACT:

Hildegard Sieberth
TU Wien
Research and Transfer Support
hildegard.sieberth@tuwien.ac.at
T: +43 (1) 58801-415243
www.rt.tuwien.ac.at

TU WIEN TECHNISCHE UNIVERSITÄT WIEN