Dr Matthias Schwab

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BASF Process Catalysts

Matthias Schwab heads the global business development and clean tech portfolio at BASF Process Catalysts. His area of responsibility involves catalysts, adsorbents & novel process technologies in four main areas: Low-Carbon Technologies, Renewable Feedstocks, Chemical Recycling and Reducing Emissions.

Hear more from Matthias at the Argus Methanol Forum, on September 9-11 in Houston, Texas, US, where he will discuss clean methanol as a feedstock for bioplastics and sustainable chemicals.

Interview with BASF Process Catalysts

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What are the benefits and challenges of developing sustainable methanol and its derivatives as a future fuel compared with other fuels?

Sustainable methanol has unique advantages that cannot be matched by other options.

Firstly, it offers scalability and potential scale efficiencies for larger projects. Secondly, it is a multi-talented molecule, with upstream feedstock flexibility for its low-carbon production and downstream optionality for direct use, storage and conversion into other fuel derivatives through power-to-X pathways. Thirdly, transport and logistics are in place already and can be leveraged.

Global methanol capacity is projected to increase rapidly, with a five-to-six-fold increase by 2050 within optimistic scenarios based on sustainable capacity ramp-up. Reducing emissions from one large global shipping company's fleet requires 5mn-25mn t/yr of sustainable methanol. Methanol's feedstock flexibility is a unique benefit, with multiple biogenic raw material pathways and CO2 from carbon capture available for conversion into e-methanol, so in principle it can match the required demand.

The deployment of green power, corresponding clean power grids, and a successful ramp-up of electrolysis make up the other side of the equation. Up to 11,000GW of green power capacity is projected to be installed worldwide

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by 2030. Today, methanol is produced, traded, transported and stored on a large scale. And, as it is a liquid compound that can be safely handled, it can also be brought in and out from more remote locations.

Our Methanol-to-SAF development project, funded by the German ministry for digital and transport, aims to produce methanol-based jet fuel and is based on all the above considerations.

Will we see more sustainable methanol in the chemical and plastics industry to produce low-carbon products?

Sustainable methanol is poised to play a crucial role in helping the chemical sector transition to a net zero future and reduce the carbon footprint of its products. Methanol serves as a versatile chemical building block that can be directly integrated into suitable value chains, such as formaldehyde and specialty amines, or converted into highly adaptable olefin building blocks through a one-step reaction.

What sets sustainable methanol apart is its ability to be sourced from multiple renewable resources, such as biomass, biogas or biogenic CO2. This makes it one of the few scalable raw materials available. Additionally, it is a drop-in into existing value chains that are fully developed and have been in operation for many years. Therefore, the focus now lies on "changing the flavour" of methanol by utilising renewable sources and establishing a reliable global regulatory framework to assess and rank the impact on product carbon footprint — both for methanol itself and its derivatives.

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To fully leverage the potential of sustainable methanol, it is important to address the cost position, which is currently higher but expected to improve significantly in the coming years. BASF Process Catalysts offers a holistic portfolio of catalyst and adsorbent materials for the conditioning and purification of suitable feedstocks, the synthesis of sustainable methanol itself, and powerful zeolite catalysts for high-yielding methanol-to-olefin processes that generate C3 and C4 olefins. In summary, sustainable methanol presents a significant opportunity for the chemical

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industry to achieve its sustainability goals, and we want to enable it by our product offering.

If you could communicate one message to the methanol industry, what would it be?

"Catalysts are there to make things work!"

BASF Process Catalysts is prepared to introduce customised catalyst solutions under our **SYNSPIRE™** methanol brand to effectively address the challenges associated with the production of sustainable methanol through new pathways. The future raw material mix for methanol will include biogenic CO2, syngas from unconventional sources such as biogas and waste, and clean hydrogen as needed.

Our tailor-made catalysts are specifically designed to overcome the two main challenges arising from new modes of methanol plant operation, particularly within CO2-based settings. They can withstand the hydrothermal stress resulting from the introduction of CO2 in the methanol loop, which is accompanied by steam as a by-product. Additionally, our catalysts can handle the dynamic operation mode linked to the on-stream time of electrolysers, which may be connected to intermittent green power supply, leading to multiple production load shifts a day. We have incorporated these aspects into our development programmes and possess long-term test data from pilot plant operations that demonstrate the superior performance of our methanol catalysts.

A modification for the synthesis of sustainable methanol in certain process configurations makes use of the so-called reverse-water-gas-shift reaction, which can also yield renewable syngas. Applying our cutting-edge, 3D-printed **SYNSPIRE™** shift catalyst can make this reaction extremely efficient.

We anticipate the commissioning of our first commercial reference this year at one of the world's pioneering e-methanol sites. In addition, our collaborations with Chinese firm Envision Energy and German chemicals company Icodos will further showcase the innovative features of our catalysts in additional projects by 2025. **BASF Process Catalysts** is dedicated to delivering catalyst solutions that enable the production of sustainable methanol with exceptional performance and efficiency.