

News Release

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New BASF CircleStar™ catalyst decreases CO₂ footprint in the bio-ethylene value chain for products ranging from jet fuel to plastics

- **CircleStar™ improves selectivity and reduces carbon emissions by more than 10 percent**
- **Novel geometry leads to better mass transfer and longer catalyst lifetime**
- **CircleStar™ contributes to transformation of chemical industry to climate neutrality**

BASF introduces CircleStar™, an innovative dehydration catalyst to process renewable feedstocks. The novel star-shaped catalyst achieves a 99.5% selectivity for the ethanol-to-ethylene (E2E) conversion. With an operating temperature that is more than 25°C lower compared to conventional processes, CircleStar™ helps to decrease the carbon footprint in the bio-ethylene value chain for products ranging from jet fuel to plastics by more than 10 percent while keeping the same performance.

The advanced performance of this innovative catalyst is due to its unique star shape that maximizes the active geometrical surface area for the reaction. In addition, the packed density in the reactor bed is significantly lower compared to conventionally shaped catalysts, which impacts the overall cost optimization of the reaction. The novel geometry also leads to a better mass transfer and a longer catalyst lifetime due to the beneficial operation temperature and pressure-drop profile.

The E2E process plays a fundamental role for the chemical industry to transform to climate neutrality and to achieve their net-zero targets. BASF has in-depth experience for more than 25 years in E2E with dedicated catalyst development and testing available. The existing Ethylene is 99 percent fossil-based while the BASF E2E catalyst is offering the possibility to change the Ethylene and its downstream value chain to make it bio-based. In this process, CircleStar™ helps to further decrease the CO₂ emissions in the bio-based route by enabling lower temperature operations, longer lifetime and lower pressure drop in the catalyst bed.

“Our novel CircleStar™ for the bio-ethanol to bio-ethylene conversion has excellent product properties and helps our customers to significantly increase their production efficiency while reducing carbon emissions and supporting their net zero targets,” said Detlef Ruff, Senior Vice President, Process Catalysts at BASF.

About BASF’s Catalysts Division

BASF’s Catalysts division is the world’s leading supplier of environmental and process catalysts. The group offers exceptional expertise in the development of technologies that protect the air we breathe, produce the fuels that power our world and ensure efficient production of a wide variety of chemicals, plastics and other products, including advanced battery materials. By leveraging our industry-leading R&D platforms, passion for innovation and deep knowledge of precious and base metals, BASF’s Catalysts division develops unique, proprietary solutions that drive customer success. Further information on BASF’s Catalysts division is available on the Internet at www.catalysts.basf.com.

About BASF

At BASF, we create chemistry for a sustainable future. We combine economic success with environmental protection and social responsibility. Around 111.000 employees in the BASF Group contribute to the success of our customers in nearly all sectors and almost every country in the world. Our portfolio comprises six segments: Chemicals, Materials, Industrial Solutions, Surface Technologies, Nutrition & Care and Agricultural Solutions. BASF generated sales of €78.6 billion in 2021. BASF shares are traded on the stock exchange in Frankfurt (BAS) and as American Depositary Receipts (BASFY) in the U.S. Further information at www.basf.com.