

# News Release

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## **Nobel Prize for MOFs: Nanostructures enable large-scale extraction of carbon dioxide from the air**

- **Chemistry Nobel Prize 2025 for metal-organic frameworks (MOFs)**
- **BASF already produces MOFs on an industrial scale**
- **Large quantities of CO<sub>2</sub> and water vapor can be stored in a limited space**

BASF produces metal-organic frameworks (MOFs) for CO<sub>2</sub> capture on an industrial scale. These nanostructures can absorb large quantities of molecules on their surface. For the development of these MOF structures, the Royal Swedish Academy of Sciences in Stockholm will award this year's Nobel Prize in Chemistry on December 10, 2025. The prize will go to the materials researchers Prof. Omar M. Yaghi, University of California, USA, Prof. Susumu Kitagawa, Kyoto University, Japan, and Prof. Richard Robson, University of Melbourne, Australia.

At the prize announcement in October, the Nobel Committee for Chemistry presented, among other things, the MOF compound CALF-20, which BASF produces at its site in Seneca, South Carolina, USA. The Canadian company Svante Technologies Inc. uses CALF-20 to separate CO<sub>2</sub> from gas streams.

MOFs are sponge-like crystalline, three-dimensional structures made of metals and organic molecules. They feature nanoporous cavities and an internal surface area of up to 10,000 square meters per gram — larger than a football pitch — and can store large quantities of molecules. MOFs can be engineered to selectively capture and store specific molecules. Thanks to their structure, they are ideally suited to extract gases such as CO<sub>2</sub> or water vapor in confined spaces, or to catalyze

chemical reactions.

“Our MOFs are already being used in commercial applications to capture CO<sub>2</sub> and to recover water from the air. We are very pleased that the Nobel Prize Committee recognizes the significance of these materials and at the same time is highlighting further fields of application, which we aim to develop together with our partners,” said Dr. Detlef Ruff, Senior Vice President Chemical Catalysts and Adsorbents at BASF.

### **MOFs: From the Beginning to Today**

BASF’s research into MOFs began around 25 years ago. During this time, researchers have investigated and developed a wide variety of MOFs for different applications: from hydrogen storage and natural gas storage to the storage of CO<sub>2</sub> and water.

Currently, BASF is primarily focused on two applications: the storage of water and the storage of CO<sub>2</sub>. For water storage, MOFs extract moisture from the air. BASF is already utilizing this in pilot projects, for example, to dehumidify air conditioning systems. Alternatively, in the future, the water storage capability of MOFs could help to supply dry regions with water captured from desert air. MOFs can also be used to reduce carbon emissions in various industries.

The Nobel Prize award demonstrates that BASF’s perseverance in MOF research has paid off. Over many years, BASF has worked closely with Professor Omar Yaghi and maintains a strong connection with him to this day. Among other things, Yaghi is co-founder of the California Research Alliance (CARA), a research collaboration initiated by BASF in the USA.

### **About BASF**

At BASF, we create chemistry for a sustainable future. Our ambition: We want to be the preferred chemical company to enable our customers’ green transformation. We combine economic success with environmental protection and social responsibility. Around 112,000 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, as core businesses, the segments Chemicals, Materials, Industrial Solutions, and Nutrition & Care; our standalone businesses are bundled in the segments Surface Technologies and Agricultural Solutions. BASF generated sales of €65.3 billion in 2024. BASF shares are traded on the stock exchange in Frankfurt (BAS) and as American Depositary Receipts (BASFY) in the United States. Further information at [www.basf.com](http://www.basf.com).