



## Tailor-made development of new catalytic active components

From the idea to the proof of concept

The Green Deal of the European Union including the Chemicals Strategy for Sustainability published in 2020 requires a transformation of industrial processes in many areas. This also affects the chemical industry and the development and use of new catalytic active materials. They are an important building block in order to be able to introduce new low CO<sub>2</sub> and environmentally friendly processes. Together with partners from industry and research, Fraunhofer UMSICHT is developing new catalytic active materials with which, for example, CO<sub>2</sub> can be used as a material, chemical building blocks can be synthesized in a climate-friendly manner or undesirable emissions from engines can be noticeably reduced

### Catalyst development at Fraunhofer UMSICHT

Fraunhofer UMSICHT develops new catalytic active components together with you according to your requirements. We accompany you from literature research through optimization to the first pilot tests. The focus of our work lies in the field of non-precious metals. These are often a cost-efficient alternative to catalysts containing precious metals, with the same or improved activity and resistance to poisoning.

We offer our customers a combination of synthesis and test facilities with various analytical options as well as an extensive range of equipment for catalyst characterization.

This allows us to identify possible structure-activity relationships of the active components and to modify the synthesis conditions in a targeted manner. In principle, we can draw on various synthesis methods for this purpose.

### Industrial sectors

- Chemical industry
- Steel industry
- Cement industry
- Fuel cell manufacturers
- Engine manufacturers
- Exhaust gas aftertreatment

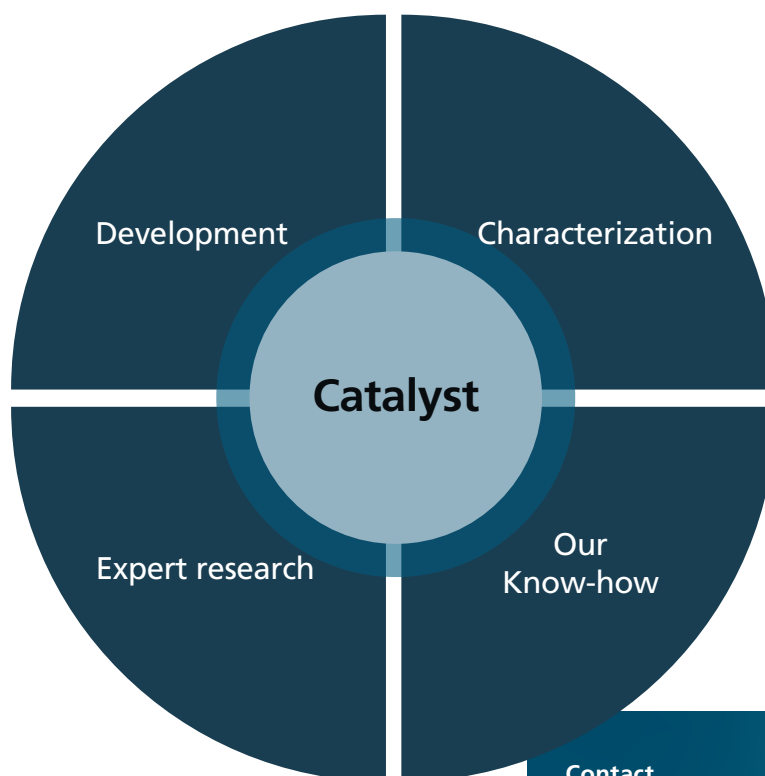
## Our service

We offer you professional support to develop a new active component for you or you need assistance in optimizing an existing catalyst system.

To this end, we review the freely accessible technical literature and work with you to develop promising material systems for your task. In doing so, we draw on our many years of experience in catalyst development, characterization and testing. Our aim is to understand the mode of operation of the catalyst on the basis of its physical and chemical properties and thus to produce the optimum catalyst.

In addition to catalyst testing and the determination of the product spectrum, the characterization of a catalyst is an important part of our service. We have a large range of equipment at our disposal for this purpose. By using the X-ray diffractometer (XRD), extensive analyses of the crystal structure as well as the composition of the precursor, the catalyst and the removed catalyst are possible in a short time. The determination of the specific catalyst surface is determined by N<sub>2</sub>-physisorption. Further findings can be obtained by various temperature-programmed methods (TPx) such as reduction or desorption with NH<sub>3</sub> and CO<sub>2</sub> as probe molecules in our BelCat device. Due to the close cooperation with the neighboring universities, further characterization, e.g. Raman spectroscopy, is possible if required.

According to your specifications, we carry out all necessary tests and characterizations or coordinate the cooperation with other partners and provide you with a comprehensive picture of the application possibilities of the newly developed or optimized catalytic active component.



## Your benefit

Together with you, we develop and optimize new catalytic active components based on our many years of experience. The decisive factor here is an understanding of the physical and chemical properties of the new material.

For this purpose, we offer you a comprehensive characterization in addition to the catalyst testing. The desired scope of analysis is determined in consultation with you and – if implementation with other partners is necessary – coordinated by us. This eliminates the time-consuming process of contacting different service providers and you receive all test and characterization results in a well-prepared, clear form from a single source.

## Keywords

- Catalyst development
- Catalyst optimization
- Catalyst characterization

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