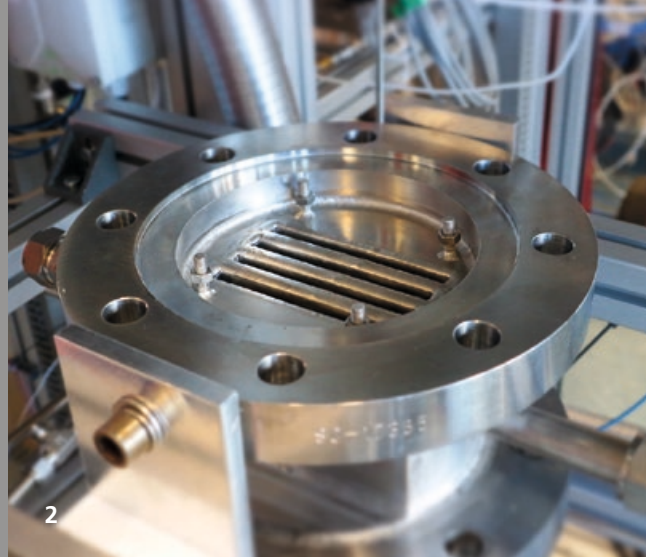


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ENVIRONMENTAL AND PROCESS ENGINEERING

FISCHER-TROPSCH SYNTHESIS – DEVELOPMENT OF SELECTIVE CATALYSTS AND PROCESSES

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In recent years, Fischer-Tropsch synthesis has undergone a renaissance against the background of the use of renewable resources. The possibility of producing several chemicals from different renewable carbon sources (biomass, CO₂) via the intermediate step of synthesis gas production explains the renewed interest in this nearly 100-year-old process. While research is in many cases focused solely on catalyst development, the focus of Fraunhofer IKTS is on the complete development chain – from catalyst to the overall process.

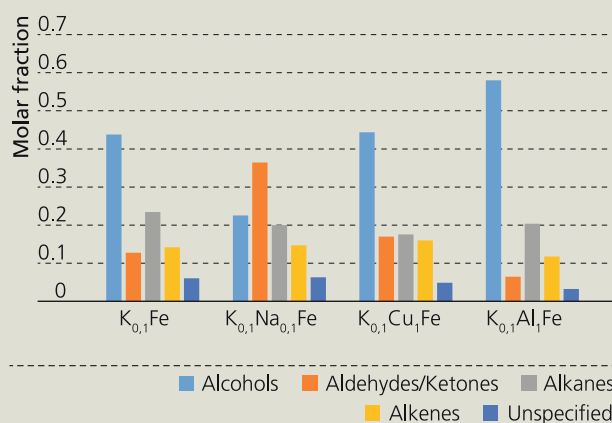
Our research in Fischer-Tropsch synthesis looks mainly at process paths leading to high-quality chemical products. Selectivity for obtaining the desired end products is optimized by developing specific iron- and cobalt-based catalysts. The higher alcohols and waxes thus produced are of particular interest for use in the cosmetics industry.

Utilizing sustainable carbon feedstocks means that small-scale decentralized plants are needed. Therefore, novel process and reactor concepts with low capital and operational expenditures have to be developed. Novel ceramic manufacturing technologies available at IKTS allow for the production of catalyst support structures with advantageous mass and heat transfer characteristics. In addition, adapted reactor concepts are in development which, among other things, will enable easy replacement of the catalyst structures at the end of their service life.

Under the coordination of IKTS, two innovative process concepts are currently being demonstrated in pilot plants. For the first time worldwide, the conversion of biogas into wax and the production of higher alcohols from CO₂ and H₂O via

co-electrolysis and Fischer-Tropsch synthesis are realized in one single technical process. The results of both pilot studies not only allow for the validation of the developed process models but also for the evaluation of economic feasibility.

Composition of the oily product phase for different promoted iron catalysts



- 1 Wax produced through Fischer-Tropsch synthesis.
- 2 Fischer-Tropsch reactor.