

Food Process Engineering at KIT (Karlsruhe Institute of Technology)



The Institute of Food Process Engineering at KIT is part of the Institute of Process Engineering in Life Science in the KIT-Faculty of Chemical Engineering and Process Engineering.

Teaching

We train bachelor and master students in the study courses Chemical and Process Engineering, Bioengineering, Food Chemistry, Industrial Engineering, and Natural Science and Technology. The basic principles of food process engineering (processes and process chains), food biotechnology, product design, and formulation technologies are taught. These theoretical lectures are also supported by internships and team projects offered. Our student teams regularly take part in national and international competitions and have already won numerous prizes at Trophelia Deutschland (<https://www.fei-bonn.de/presse/pressemitteilungen/pm-20180720-ecotrophelia-kofco-eatapple-mixcuit>) and Ecotrophelia Europe (<https://eu.ecotrophelia.org/content/5-germany-kofco>) with products such as eatapple, Mixcuit, Brost, or kof.co (see Fig. 1).



Fig. 1: Products of our student teams, developed as part of the Trophelia Deutschland competition in 2016-2018: kof.co, Brost, Mixcuit and eatapple
(Source: FEI; Picture source: <https://www.fei-bonn.de/foerderung/nachwuchsfoerderung/trophelia>)

Research

We conduct research in four teams on the following topics (Fig. 2)

- *Interfacial functionality of pectin-based biopolymers*: The focus is on locally produced pectins and pectin-protein conjugates and their application in single and double emulsions and microgel particles.

- *High pressure homogenization*: The research focus is on the analysis of local flow conditions and the design of dispersion units for the adjustment of drop/particle sizes or reaction conditions in emulsions and dispersions. We develop e.g. so-called SHM / SEM units (simultaneous homogenizing/emulsifying and mixing) for difficult dispersing or mixing tasks with temperature control, e.g. for melt emulsions.
- *Design of energy efficient drying and freezing processes*: The research work focuses on the targeted design of product properties and efficient use of resources (raw materials, water and energy). To achieve this, we are investigating, among other things, the use of modern microwave generators (solid-state) for heating, the relationship between nozzle design and atomization performance of liquid nozzles in spray drying and the dependence of ice structure formation on additives in frozen products.
- *Extrusion of biopolymers*: Our research work focuses on the development of a research approach and tools to characterize the extrusion process at the mechanistic level. This allows us to predict the conditions necessary to achieve desired product functionalities and to identify scale-up relevant parameters. Currently, we work on the design of functional and sustainable products, based mainly on plant proteins and dietary fibers.

The aim of our research is always to create models that allow us to improve processes in terms of sustainability and products in terms of quality and safety. Theoretical research is supported by experiments in our well-equipped pilot plant and by high-resolution process-structure analysis.

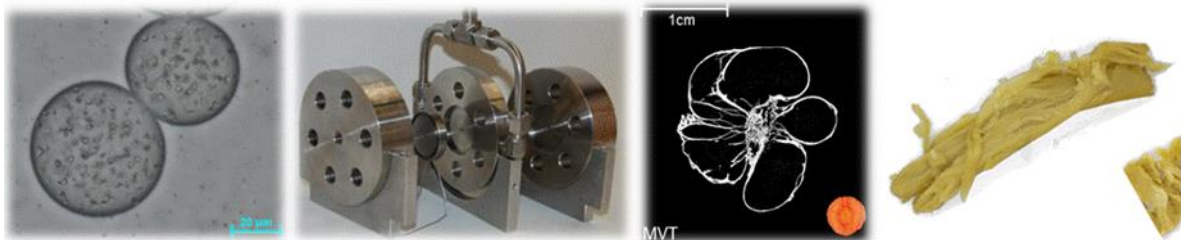


Fig. 2 Images from our research topics (Source: KIT/LVT).

From left to right: microgel-stabilized emulsion drop based on pectin; SHM crushing unit for application in high-pressure homogenization, μ CT image of a microwave vacuum-dried carrot slice; Example of an extruded meat substitute product based on wheat protein

Collaborations

Our research work is embedded in interdisciplinary national and international research projects. We cooperate with partners from the food industry, life science, fine, agro and general chemistry, as well as apparatus engineering in various project forms.

We are involved in ProcessNet, FEI, MIV, acatech, IFT, ICEF and IUFoST.

Interested? Then please feel free to contact us personally. Contact persons can be found here: <https://lvt.blk.kit.edu/>

Further information and contact

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