Curriculum Vitae

Michael Beyrer is a full professor at the University of Applied Sciences (UAS) of Western Switzerland, where he heads the group “Sustainable Food Systems”. He received his master’s degree (Dipl.-Ing.) in food technology in 1991 from the Humboldt-University of Berlin (Germany) and PhD in 2007 from the Technical University of Berlin (Germany). During his professional career, he worked in the beverage industry (brewery), in an industrial food R&D centre, and managed a rheological laboratory before being employed as a collaborator and lecturer at the UAS of Neubrandenburg (Germany). Since 2007, he has taught courses in food process engineering, food technology, and food physics at the Bachelor's and Master's levels. He also supervises PhD and postdoc students.

His research focuses on interdisciplinary R&D. The Swiss agency of innovation (Innosuisse) provided most of his project funding, and the innovation projects typically involve company partners.

Engineering unique food solutions is the aim of the R&D projects of his group. Current projects focus on the following:

- Plant-based food: Designing of cooling dies for high moisture extrusion cooking; flow dynamics; flavour release; protein reactions; control loops in high moisture extrusion cooking
- Structuring of dairy proteins by combined thermal, mechanical, and electric effects: application of pulsed electric fields and cell design; fluid dynamics; crossflow filtration; characterization of protein properties; integration in powder manufacturing processes
- Food powder decontamination by cold atmospheric plasma (CAP) treatments: configuration and in-house design of CAP devices; inactivation kinetics of microbes in powders; minimization of plasma power; toxicological studies; analysis of physical food powder properties
- Flavour release kinetics: new experimental setup for the description of dynamics of the flavour release from liquids and solids; determining and modelling flavour release as a function of flavour molecule properties, the composition of the food matrix, processing parameters such as flow dynamics and thermal conditions
- Delivery systems of bioactive compounds: Advanced extraction methods, including superfine grinding and processing in electric fields; physical and chemical

characterization of hetero-colloidal systems; functionality testing, including impacts on the gut microbiota

- Vacuum-steam-vacuum processing of powdered food: Engineering of fluidized bed reactors up to the pilot plant scale; kinetics of inactivation of microbes in powdered food; structure of powders and techno-functionality; heat transfer by condensation and evaporation in porous materials
- Non-thermal processing of foods
- Advanced training courses on emerging technologies

To achieve the challenges of projects, the research team interacts with partners from the academy and industry.

Further information and most publications are available on ResearchGate and LinkedIn.

Important research project topics

Dry and wet protein extraction from pulses for local economies (Innosuisse funding)

Inactivation of contaminants in protein concentrates with PEF technologies (Innosuisse funding, PhD project, collaboration with Prof. Marcel Zwietering/Wageningen)

Equipment and technology for extracting plant proteins and manufacturing a **plant-based semi-hard cheese** (Innosuisse funding)

Technology for downstream processing **micro-algae proteins** and use of such extracts in plant-based food manufacturing (Innosuisse and funding by the canton Fribourg)

A system for the **fibrillation of plant proteins** (PhD project, Innosuisse funding, collaboration with Prof. A. J. van der Goot/Wageningen)

A process for manufacturing **powdered Cobalamin** for the B12-enrichment of plant-based food (Innosuisse funding)

Micro-structuring of whey proteins by a thermo-electric hybrid technique (PhD project, Innosuisse funding, collaboration with Prof. A. Mathys/ETHZ)

Extraction, encapsulation, and release of **Truffle flavour** (Innosuisse funding)

Cold plasma applications for decontamination of food powders (SCIEX program, European MSCA action, collaboration with the Suisse plasma centre of the EPF Lausanne)

Fibrillation and flavouring of pea protein with a high moisture extrusion cooking process (Innosuisse funding)

Structuring of whey proteins with a re-designed tubular heat exchanger (Innosuisse funding)

Structure-induced thermal inactivation of microorganisms on the surface of fine-particle food systems by a **vacuum-steam-vacuum process** (two PhD projects,

Innosuisse, collaboration with Prof. E. J. Windhab/ETHZ)

Prediction and optimization of the performance of encapsulated flavours in food processing (Innosuisse funding, PhD project, collaboration with Prof. R. M. Boom/Wageningen)

Extrusion of biopolymers for encapsulation of pharmaceutical products (University of Applied Sciences and Arts Western Switzerland)

Edible coatings for improvement of the shelf life of multi-phase foods (University of Applied Sciences and Arts Western Switzerland)

Cold denaturation and freeze structuring of fish protein (AIF funding, Technical University Berlin, Prof. W. Fleischer)

Oxidative degradation of **polycyclic aromatic carbon dioxides** by fungi and synthesis of humic macromolecules (F. Schiller University Jena, Prof. W. Fritsche, Prof. M. Kästner)

Heterologic transformation of *Penicillium* for **cellulase production** (Humboldt-University Berlin)

Genetical manipulation of *Saccharomyces* spec. (University St. Petersburg, F. Schiller University Jena)