

## Bio-SMiLE Project Description

**Colourful Biotechnology: Sustainable Mycelium-based Leather and Fungal Eco-Dyes from Agricultural Waste Streams (Bio-SMiLE:** funded under the BMBF-call “Bioeconomy International 2025 – Cooperation with Thailand”)

The Bio-SMiLE project unites researchers from Germany and Thailand to transform agricultural and food-industry side streams into high-value fungal biomaterials. By combining systems biology, metabolic engineering, and materials science, the consortium aims to create high-performance vegan leather coloured with natural fungal pigments.

At the Technical University of Munich (TUM), the research team will decode and engineer pigment biosynthetic pathways in *Hypoxylaceae* fungi through integrated genomic, transcriptomic, and proteomic approaches. In parallel, engineered *Aspergillus niger* strains will be developed for the sustainable production of selected pigments as dyes, which will be further scaled up at the Department of Microbial Drugs (MWIS) at the Helmholtz Centre for Infection Research (HZI) in Braunschweig. Ultimately, these fungal pigments will be applied to mycelium-based leather made by the Thai partners.

### PhD Position (m/f/d)

#### Biotechnological production of dyes using recombinant producer strains

The current position will be part of the **Fungal Biotechnology in Wood Science** professorship (Prof. Dr. J. Philipp Benz) at the TUM School of Life Sciences, and will work on the biotechnological production of dyes using recombinant producer strains. The professorship has a strong expertise in fungal biology and biotechnology with a focus on the perception, transport and utilization of carbohydrates by fungi as well as the production of hydrolytic enzymes. Another part of the group is developing sustainable materials based on mycelium-bound composites using wood-degrading fungi.

#### Your profile

- Master's degree in biology, biotechnology, molecular biology, biochemistry or related fields
- Experience in biochemistry, genetics, multi-omics data analysis, and/or genome annotations (R or Python skills desirable)
- Prior experience in engineering *Aspergillus* spp. is a plus
- Strong motivation for interdisciplinary research and international cooperations
- Excellent English skills, basic German an advantage

#### Your tasks

- Perform genome, transcriptome, and proteome analyses to identify pigment biosynthetic gene clusters in filamentous fungi
- Apply systems biology and synthetic biology tools to study and engineer pigment pathways
- Express selected biosynthetic clusters heterologously in *Aspergillus niger*
- Collaborate closely with partners in Germany and Thailand and contribute to publications and reports

#### Our offer

- Interdisciplinary environment combining biotechnology, bioinformatics, and materials science
- Access to state-of-the-art facilities and collaboration with leading institutes in Germany and Thailand
- 65% TV-L E13 position for 36 months, available from January 2026, based at the TUM School of Life Sciences in Freising

#### Application

Please send your application (single PDF: motivation letter, CV) by email with subject line “PhD Bio-SMiLE” to [benz@hfm.tum.de](mailto:benz@hfm.tum.de) and [tian.cheng@tum.de](mailto:tian.cheng@tum.de), until 31.11.2025.

TUM is an equal opportunity employer. Applications from women and individuals with disabilities are especially welcome.