Biopolymers are becoming increasingly important to both industry and consumers. With regard to waste management, CO₂ balance and the conservation of petrochemical resources, increasing efforts are being made to replace standard plastics with bio-based polymers. Polymer foams are an important focus of research. Their good mechanical and insulation properties mean that they can be applied in various sectors.

Advantages of bio-based foams

- Resource efficiency through the use of sustainable raw materials
- Reduction of waste due to biodegradability
- Cost savings, as lower quantities of materials are needed
- Processing can be carried out using conventional technologies
- Competitive advantage through innovation

Biopolymer foams

The advanced facilities available at the Fraunhofer ICT enable biopolymer processing in a complete product cycle, from a tailored compound to the final foamed product. Both bio-based extruded semi-finished products and particle foams can be produced on a foam extrusion line with underwater granulation, and on a Krauss Maffei Berstorff Schaumtandex laboratory line ZE 30/KE 60.
The further processing of complex molded parts with a defined density (30 - 200 kg/m³) is carried out using a laboratory molding machine (filling volume: 2 liters) and a steam chest molding machine from Erlenbach GmbH (clamping dimension: 570 x 670 mm).

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**Material development and characterization of bio-based foams**

Individual property profiles and biofoams tailored to specific applications can be produced on our comprehensive compounding line. The Fraunhofer ICT has extensive experience with environmentally-friendly additives and halogen-free flame retardancy.

Characterization includes:
- Rheology (melt strength, extensional viscosity)
- DSC, IR spectroscopy
- Mechanical values
- Thermal conductivity
- Cell structure analysis (light microscopy, REM)
- Flame retardancy test (UL 94, FMVSS 302, DIN 4102-1 (B2), DIN 4589, FAR 25.583 (F1, F2), Oxygen Index, EN 60695-2 (Glow Wire))

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**Application range**

The Fraunhofer ICT’s objective in the development of biopolymer foams is to replace oil-based plastics with biopolymers. There are a variety of potential applications, including:
- Packaging industry
- Thermal insulation, particularly in the construction sector
- Utensils, such as handles, toys, or filters
- Automotive industry

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**Our offer**

- Material development for the production of tailored biofoams, for example cellulose-based polymers (CA, CAB, CP) or polylactide (PLA)
- Optimization of the technical property profile of biopolymers
- Additivation of biopolymers according to their application field, for example the addition of halogen-free flame retardancy, fillers and reinforcing materials
- Process development for the production of foamed elements such as extruded semi-finished products or particle foams
- Characterization of matrix materials and foams
- Tailored solutions