Lignin

HOCHSCHULE ANHALT University of Applied Sciences

FORSCHUNG FÜR DIE ZUKUNFT

# Fiber reinforced thermoplastics for sustainable 3D-Printing

## Problem definition

The study focuses on researching and establishing 100% bio-based and potentially biodegradable natural fiber composites based on the biopolymer lignin. The aim is to make the materials available for use in new technologies such as additive manufacturing (3D printing) to replace petroleum-based plastics in suitable areas. A robotically controlled FGF 3D printer is used for the research.

## Results, Checkpoints, Next Steps

Lignin-based, 100% bio-based and potentially biodegradable natural-fiber composites are being developed for FGF 3D printing. The composite is already printable; current formulations contain ~50–60% lignin. Test series vary plasticizers, fiber type/length, crosslinker content, and flow aids. DSC is used to define thermal transitions and processing windows; SEM assesses fiber embedding within the polymer matrix. Initial mechanical data (partial tensile tests) are available; current work focuses on determining compressive properties. Next checkpoints: (1) design/application demonstrators via FGF printing, (2) disintegration and biodegradability studies, (3) three-point bending tests, (4) expanded fiber-variation campaigns. The aim is a scalable, petroleum-free material system to replace conventional plastics where appropriate.


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