

Mushroom-based material as a plastic alternative

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With the help of higher fungi (Basidiomycota) it is possible to degrade lignocellulosic particles or wastes from industry and agriculture. The Basidiomycota form bio-based polymers in conjunction with the particles. This fungal mycelium particle composite can be used to grow into almost any shape.

Mushroom-based materials are water-repellent, have a density of 0.10-0.15 g/cm³ in the dried state and are hardly inflammable. This makes them as a good plastic alternative to conventional packaging moldings, as well as insulation materials, such as polystyrene. In addition, they have a higher resistance to heat and a much lower smoke development in comparison to polystyrene.

In the experiments at the IHD in Dresden it was examined to what extent the mushroom-based material is suitable for the use as a shaping structure for furniture, and which degree of stability can be achieved. First of all, a Grow-it-yourself KIT from KROWN, Netherlands was tested. KROWN produces mushroom-based materials under the license of Ecovative LLC. However, the shape made with the Grow-it-yourself KIT remained unstable. Some experiments were with substrates and fungi carried to give. Some experiments were with substrates and fungi carried, to give stability of the forms. The preliminary result was a piece of furniture or rocking horse for children. Moldings from three different fungi cultures were grown for the furniture. The organic based material was constantly improved during the process of the experiments.

The result of the experiments was a stable mushroom-based material. The raw material was maize spindle and hemp shives. This was inoculated with *Ganoderma* spp. and allowed to grow together. Thus agricultural waste products could be up-cycled or upgraded in terms of cascade use into environmentally friendly fungal polymers. After being used as a packaging or insulation material, the material can be composted or used as a soil fertilizer and returns in the biological life cycle of materials.