BIOTEXFUTURE

FUNGAL FIBERS

BIODEGRADABLE ANTIBIOTIC SOLUTION-SPUN CHITOSAN FIBERS FROM A RELIABLE, REPRODUCIBLE AND UP-SCALABLE FUNGAL-BASED PRODUCTION PROCESS

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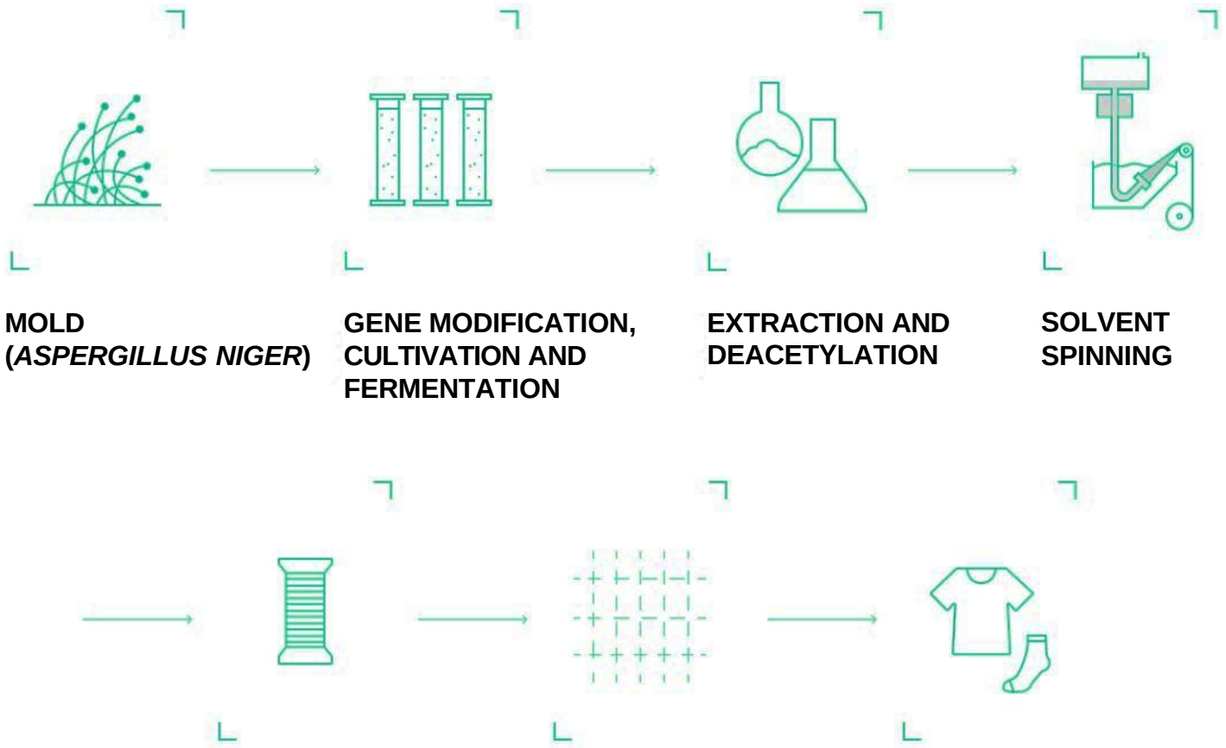
CONIDIOPHORES AND SPORES OF *ASPERGILLUS NIGER*

MOTIVATION

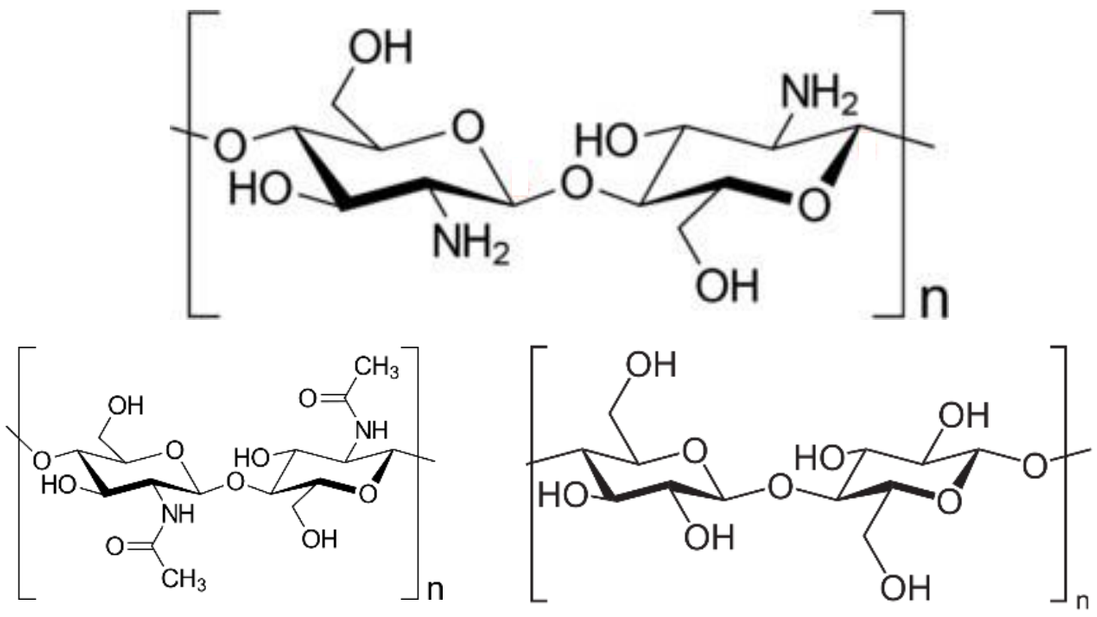
Against the background of limited resources such as petroleum, water and arable land, as well as increasing environmental degradation and conflict potentials, there is a great social and entrepreneurial interest in providing competitive, socially and ecologically sustainable raw material alternatives for the textile industry.

SCOPE

The goal of this project is to develop a completely new process chain for the production of bio-based, vegan textiles from chitosan fibers (filament and staple fiber yarns). The present project intends to produce chitosan from the well-established and globally dominant industrial cell factory *Aspergillus niger* with very high throughput, high quality and purity, short production time, gentle extraction and multiple refining and transformation options. Here, the chitosan is obtained from primary raw material sources (industrial cultivation of genetically engineered filamentous fungal) as well as secondary raw material sources (waste stream from industrial filamentous fungal cultivation).



CHITOSAN



CHITOSAN

Chitosan is a polysaccharide and chemically closely related to chitin, the most abundant compound in living nature after cellulose. It occurs naturally in a variety of sources: Insects, crab and crayfish shells, and as a structure-determining cell wall component of all fungi. Therefore, chitin can be derived from by-products in the production of crab meat, insect protein, or fungal biomass waste from industrial processes. Chitosan, for its part, can be readily produced from chitin by deacetylation. The remarkable properties of chitosan such as biodegradability, antibioticity and compatibility with cotton and cellulose make it a promising biomaterial for the production of natural fibers for textile applications.

FUNGAL FEEDSTOCK

The industrial cultivation of fungi is already state-of-the-art in the production process of various materials, including pharmaceuticals like penicillin and proteins as food supplements. The polymeric fungal components (chitin and chitosan) are largely unused and sent for composting or thermal recycling. However, the controlled environment in which fungi are grown during industrial cultivation allows for the production of polymers with high purity, high molecular weight, and adjustable properties to meet specific application needs. The combined fungal-based production of the above products offers a cost advantage over other biopolymers and a real chance of economic competitiveness over petroleum-based polymers.

SPONSORED BY THE
Federal Ministry of Education and Research