



XENOKAT: DEVELOPMENT OF A BIOCATALYTICAL FILTER SYSTEM

Ideas on utilisation

Xenobiotics are chemically synthesized compounds that do not occur in nature and thus are foreign to the biosphere. These are pharmaceuticals, dyes and other chemicals; most of them enter into environment through discharge of domestic sewage effluents with many ecological effects.

The objective of the XenoKat project is to develop a filter technology with biofunctionalized metals for water treatment. Porous metallic hollow spheres and open celled metallic foams were successfully tested as carrier for the immobilization of enzymes.

The enzymes can be produced from white-rot fungi like *Trametes hirsuta*, thus immobilized enzymes are able to remove xenobiotics by biocatalysis after the classical sewage treatment plant.



Figure 1 Metal Foam (10 ppi, stainless steel, Fraunhofer IFAM)

Potential adopters of technology

In addition to the use in the clear water area of sewage treatment plants, other fields of application could be identified. These can be divided into the following categories:

- Water treatment: groundwater, surface water, special wastewater, leachate, landfill water
- chemical catalysis: coupled, chemical and biochemical catalysis]

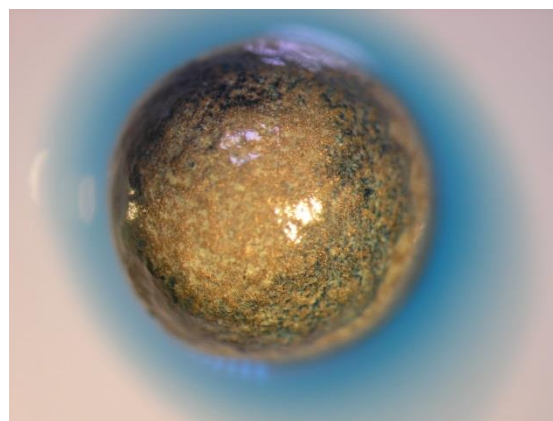


Figure 2 Metallic hollow sphere immobilised with Laccase from *Trametes hirsuta*. Product of laccase reaction is the blue colour around and on the sphere

Advantages of technology

The enzymes of Basidiomycetes (fungi) can provide important biocatalytic benefits in the degradation of predominantly ring-shaped compounds. They are produced by the fungi (genetically unchanged) and isolated by means of biotechnological processes. In a filter system to be developed, they are supposed to oxidize and reduce xenobiotics in immobilized form on highly porous carriers, thereby contributing to degradation faster.]



Market and context of technology

Once feasibility has been demonstrated on a laboratory scale, it is now being implemented on an industrial scale so that filter technology systems can be developed for large-scale industry.

Project management: TU Dresden, Bioprocess Engineering (INT) Group Enzyme Technology, Project collaborators in XenoKat are the CIMTT at the TU Dresden, the Bundesanstalt für Gewässerkunde Koblenz, as well as the company ASA Spezialenzyme GmbH, Wolfenbüttel.

Projekt duration: 01.05.2017 - 30.04.2019



Spezialenzyme GmbH

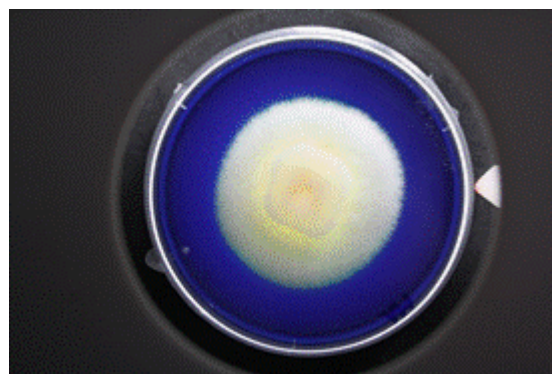


Figure 3 Agar plate with blue dye and *Trametes hirsute*, to see is the decolorisation around and under the fungus.

Bildquellen: © AG Enzymtechnik TU Dresden



Preconditions in adopting enterprises

[

- Which pre-conditions are necessary in the adopting enterprise? (Needs for investments, qualification of staff, legal permissions/ approvals, expenditure of time, changes in business and production processes etc.
- Which dependencies in relation to upstream and downstream processes/ technologies in the value chain do exist? Is there a need for changing other technologies as well?

approx. 500 characters]