BIOCATALYSTS ON TEXTILES

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Abstract: The immobilization of enzymes on textile support materials offers numerous advantages and holds great potential for applications across various fields. Textiles provide a versatile substrate for enzyme immobilization due to their structure, surface chemistry and mechanical flexibility. By immobilizing enzymes on surfaces, enzymes can be deployed in diverse environments and can be easily reused. This opens new opportunities for biotechnological applications in the food and beverage industry, environmental engineering and pharmaceuticals.

Keywords: *enzymes, immobilization, textiles*

We present various methods for the permanent immobilization of enzymes on textile carrier materials that have already been successfully developed at our institute [1,2]. Natural and synthetic textile materials such as cotton, polyester or polyamide are appropriate as carrier materials. They either already have reactive groups on their surface or reactive groups can be generated on the surface by several methods, such as aminolysis or pre-functionalization. The reactive groups are suitable for direct binding of the enzyme and can be improved by the additional use of crosslinkers. The fiber-bound biocatalysts can be used in various technical areas and industries. For example, immobilized peroxidases can be used in the food industry to bleach colored whey [3] and immobilized laccases are able to degenerate micropollutants from wastewater [4]. A current project deals with peptidases and their use in wine clarification. Enzymatically catalyzed reactions offer the advantage that they can take place under mild conditions, are highly selective and small amounts of the catalyst are sufficient for a reaction. Immobilization enables simple separation after the reaction has taken place and the reusability of the expensive enzymes. In addition, the enzyme immobilization methods developed at the DTNW can be transferred to other catalyst classes.

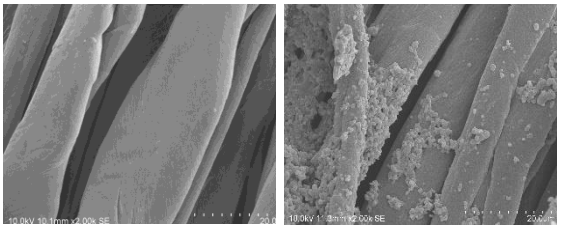

Figure 1 Scanning electron microscopy of the unmodified cotton fibers (left) and the enzyme-loaded fibers (right). The picture represents a cross-linked peptidase.

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